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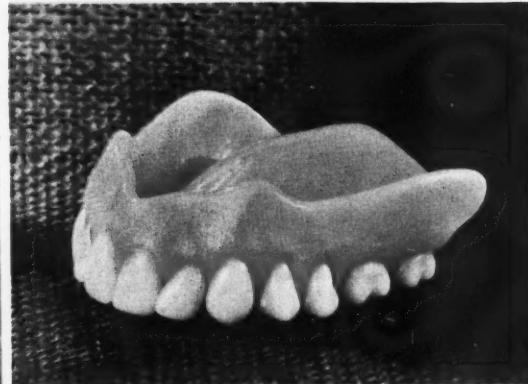
Vol. 41

No. 8

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"The solution of this problem does not consist in fettering the profession . . . "

THE COST OF DENTAL CARE: ITS SIGNIFICANCE IN PRESENT TRENDS IN DENTISTRY

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Elmhurst, Illinois

THE growth of the tendency toward compulsory health insurance, I believe, is due fundamentally to two reasons: (1) the addition of converts from all income groups; (2) the profession itself has been placed entirely on the defensive; consequently any attempts at settlement of the problem was necessarily predominantly unfavorable to the profession.

Any equitable solution of this problem must be based on (1) a clear understanding of the attitude of the public toward dentistry and the reasons for that attitude; (2) determination of the justness of that attitude; and (3) practical adjustments for solving the problem.

ATTITUDE OF THE PUBLIC TOWARD DENTISTRY

We all know too many low-income people demanding gold inlays, porcelain restorations, and the other best grades of dentistry, and conversely, too many in the upper income brackets who are satisfied with the amalgam restorations and even with the cheap clinic and the unethical practitioner. The income of members of society is not always indicative of the type of service sought. Classification must be based on the attitude of the public toward dentistry. The expression of this attitude, it is true, is exhibited in its reaction to the cost of dental care; but the origin of this

attitude is more complex than just the degree of ability to pay.

My association with patients has convinced me that the majority of the public believes that dental fees are high. While patients have this common conception, the forces generating it vary, so that they fall into five general groups, as follows:

THE INDIGENT AND LOW-INCOME GROUP (GROUP 1)

Anyone familiar with economics realizes that the ability to maintain or attain a desired standard of living always lags behind the wish to do so; consequently, regardless of the plane of any particular standard of living, one is always passing selective judgment upon what shall be bought with the funds at hand. As often as not the desire for comfort or the satisfaction of pride will overshadow the more rational obligation of a definite need.

The Indigent—In the case of the indigent, food, shelter, and clothing are meagerly provided. With the development of medical and dental care into a basic need the necessity of provision for it means added hardship. Those in this unfortunate group must, therefore, believe that the unprovided necessity is high at any price, and their demand to bring it within their reach is natural.

The solution of this problem does not consist in fettering a profession

concerned with the physical welfare of all groups of society. The hardships attendant to this situation are due to the fact that the socio-economic order, ignoring the need, permits this group to work for what constitutes less than a living wage; therefore the responsibility and the cure is a socio-economic problem which lies in the realm of labor and wages.

The Low-Income Group—My practice comprises a complete cross-section of an average heterogeneous community. In it are factory hands, farm hands, housemaids, machinists, clerks, and so forth, up to and including officials and heads of businesses. In other words, every type of worker and every income group, from the lowest to the highest, is included.

I believe it logical to assume that if a good representation of any income group purchases certain commodities or services, that group as a whole can do likewise. Whether some in that group demand or want them is naturally their own concern. But their failure to receive the benefits accruing from the possession of those commodities or services cannot then be grounds for criticism of the producers or dispensers of them.

My experience with this group has convinced me definitely that many of those not receiving proper dental care do not want it; that those who can-

not afford it or those who find its cost a hardship are in that position because of misapportionment of funds as far as basic needs are concerned rather than because of real lack of income.

This situation, however, finds the low-income group in the same state of mind as the indigent: The cost of dental care is high because no provision is made for it.

GROUP 2

Group 2 comprises those who believe that organized dentistry charges as much as the traffic will bear and is reaping excessive profits. This belief is due largely to the following facts: The only public discussion of cost is by the advertising dentist; the ignorance of the public with respect to the difference between good and bad dentistry is traded on with exaggerated claims by those whose sole aim is exploitation for profit. Organized dentistry in its conception of ethics, allows these claims to go unrefuted and by its silence becomes damned by the public's belief that it has no argument; organized dentistry, cautious because of its knowledge, accepts too little responsibility for its services; on the other hand, organized dentistry tries to justify and exalt its services and fees to a hard-headed, close-buying public having a dollars-and-cents conception of values with arguments based on generalities and abstractions.

" . . . the responsibility is a socio-economic problem which lies in the realm of labor and wages . . . "

GROUP 3

Group 3 refuses to recognize the necessity of dental care until its need is forced on it. Then, its members, disliking its necessity and discomfort, feel that any fee paid is too high.

GROUP 4

Group 4 comprises a large part of our so-called satisfied patients who appreciate dental service but believe, as one patient expressed it, "While we are sure the work is good, we are paying a good price for it too." This is due to the fact that their appreciation of good dentistry is based on dental experiences involving both difficulty and considerable expense. These patients are, therefore, favorable to any suggestion involving lower cost. The one who has had little need of dental care has little conception of its value and is usually a member of Group 3.

GROUP 5

The remainder of the satisfied patients comprise that small group who are keenly aware of the esthetic and vital importance of good dental care. They ask the best of professional service and are willing to pay the required fee.

Inasmuch as cost is the basic reason for demanding a change in the methods of caring for the medical and dental needs of the public, the result of such an analysis becomes

significant. It explains the growth in numbers of those favoring social medicine and dentistry, because the cry of those who cannot has also become the cry of those who would not and of those who will not. It augurs ill when four groups out of five of the public are unfavorable toward dentistry because of cost. Any legislative action requiring popular vote will doubtless jeopardize the welfare of the profession.

The profession must, therefore, determine what the actual facts disclose and where the responsibility for the development of this attitude lies. If we know these facts, we will be better able to decide on how to correct the conditions and what changes are required for the correction.

DATA FROM PRACTICE

The figures and facts given in the accompanying tables are derived from treatment of 734 patients who sought dental services over a period of from three to ten years. They have been selected because they are known definitely to be regular patients. All transients and floaters have been eliminated.

It will be noted from Table 1 that good average fees were charged which give a fair return to the operator in the district in which I live.

Tables 1 and 2 classify the 734 patients according to the average cost to the patient and according to the maximum amount paid.



TABLE 1—Service and Fees

Type of Service	Fee
Two surface amalgams	\$4
Single surface amalgams	\$2 and \$3
Two surface gold inlays	\$15
Synthetic enamel restorations	\$4
One surface gold restorations	\$10
Extractions	\$2 and \$3
Vulcanite dentures	\$50
Bridgework	\$20 per unit
Treatments	\$2 and \$3
Root therapy	\$5 and \$6
Prophylaxis	\$3
Roentgenograms	\$1 each; \$5 for complete set of 14 films

TABLE 2—Average Cost of Dental Care Among 734 Patients

Number	Per Cent	Average Cost	Service
146	20.	More than \$35	Prosthesis
77	10.5	More than \$35	Operative Dentistry
76	10.5	From \$30 to \$35	Miscellaneous
59	8	From \$25 to \$30	Miscellaneous
81	11	From \$20 to \$25	Miscellaneous
88	12	From \$15 to \$20	Miscellaneous
98	13	From \$10 to \$15	Miscellaneous
73	10	From \$5 to \$10	Miscellaneous
36	5	Up to \$5	Miscellaneous

TABLE 3—Maximum Cost to Patient

Number	Per Cent	Cost at Time of Greatest Expense
114	15.53	\$100 or more
46	6.26	Between \$75 and \$100
94	12.80	Between \$50 and \$75
185	25.20	Between \$25 and \$50
295	40.20	Not more than \$24

TABLE 4—Dental Habits of 734 Patients

Number	Per Cent	Sought Professional Services
155	21.1	Once a year or oftener
55	7.5	At two year intervals
86	11.7	At three year intervals
438		At intervals from 4 to 10 years

It is seen from the figures in Table 2 that 69.5 per cent of these patients paid an average of less than \$35.00 per dental bill; that another 10.5 per cent paid an average of more than \$35.00 per bill for operative work only; this was due either to choice of gold for restorative material or to the devastated condition of the teeth. The other 20 per cent that paid an average of more than \$35.00 did so because of prosthesis.

In comparing Tables 2 and 3 we see that the 30.5 per cent whose average cost was \$35.00 or more because of prosthesis, gold work, or devastated mouths includes almost all the 34.59 per cent of those who paid a maximum of \$50.00 or more at any one time. Table 3 shows that the other 65.4 per cent of these patients did not pay more than \$50.00 at the time of greatest expense, regardless of the type of work they had done.

DENTAL HABITS OF PATIENTS

An analysis of this group of 734 patients concerning the frequency with which they sought professional services is given in Table 4. Nearly 80 per cent of even those whom one can consider as regular patients had no definite, constructive dental habits, seeking dental care only when disorder or pain drove them to a dentist. This to me is rather startling and urges promptly the question of the effect of this neglect on the cost of dental care. To determine this, the charts of 2319 patients were examined. The actual cost of dental care for these patients averaged \$33.34 per patient. The normal cost of the work indicated, if it had not been complicated by treatments, large restorations, replacements, and other results of neglect, should have been \$20.43. In other words, 2319 patients paid an average of \$12.91 or 63.19 per cent more for dental work than they should have, because of their poor dental habits and neglect.

Under present average methods of professional care and its use, the patient who seeks regular services once a year or oftener is generally the highly susceptible patient.

In 128 of the 155 patients listed as seeking examination and care once a year or oftener, and whose mouth condition was uncomplicated by periodontal disorder, the indicated work averaged \$9.87 per year. With five exceptions, the averages per patient amounted to under \$18.00 per year. This means that even among the most susceptible patients the cost of dental care did not average more than \$18.00 per year. Another significant fact was that the average

number of cavities among these patients was 2.5 per year. The average among 2490 patients according to their charts was 6.24.

SIGNIFICANCE OF FACTS

When one considers the average cost and the maximum cost at the time of greatest expense, and then compares the results with what the public pays for automobiles, radios, refrigeration, cosmetics, amusements, and so forth, the belief of the public that the cost of dental care is high because of high dental fees appears unjustified. The accompanying tables show that even at the high average fees quoted, *dental fees are equitable*. If these results are adjusted to correspond to lower fees charged in many offices, this fact is still more emphasized. These facts also point a significant finger to the effect of the poor dental habits of the public itself on the price it pays for dental care.

These facts, I believe, point the way to a practical solution of the difficulty. If the belief of the public is contrary to the facts, its attitude as a result of that belief ought to be altered favorably if it is informed of those facts, particularly since they show that the responsibility for the development of that attitude lies in the lap of the public itself, because of its improper utilization of the services offered it.

The responsibility for changing the attitude of the public and changing its dental habits is that of the dental profession itself. I believe that this attitude of the public and its dental habits can be changed by applying the truths made evident in the foregoing facts with support from a like assemblage of facts by others. I believe that both results can be obtained without any radical or cumbersome changes in the present system of rendering dental services to the public. I believe that the public can attain its desires without jeopardizing the efficiency or the progress of the profession devoted to its care, or requiring a reduction in the present basic rates of fees. Not only that but the profession will be enabled to render a still higher standard of service at the lowest average cost to the patient in the history of dentistry.

This accomplishment embodies the necessity of certain adjustments in the present methods of practice, with the primary objectives of changing the attitude of the public toward dentistry and its dental habits.

CHANGING THE ATTITUDE OF THE PUBLIC

With the public in its present

frame of mind, any legislative action put to popular vote foredooms the welfare of dentistry. The dental health of the people has improved because dentistry has dragged mankind up the path of advancement with it. When the public legislates to drag the profession down to its level, progress stops. This attitude must be changed before the dental habits of the public can be greatly improved, for one will not listen to reason unless one believes it to be reason.

Organized dentistry has talked wisely but too much on the value of dentistry as a health service. It is time it began talking on the economy of good dentistry as well. With the path leading to the advertiser and the cheap clinic growing wider with increasing use, the ethical dentist must realize that the words of idealism become whispers against the roar of straitened circumstances. If the patient is thinking in the language of dollars and cents, we must speak to him in his language.

The family dentist who sees his patients year after year has figures no dollar hunter among transients can have. Let the family dentist provide these figures; but let the expression and presentation of them by his organized profession give them dignity and authority. Silence may prolong or aggravate an argument; it can never cure it. Public expression of facts that give added proof of the benefaction of a profession to its public cannot be misconstrued or scoffed at. The time has come for dentistry itself to speak directly to its public on these matters which concern it, instead of leaving it to those exploiting for profit to cloak their purpose with high-sounding phrases and magnanimous gestures.

CHANGING THE DENTAL HABITS OF THE PUBLIC

The public has been well educated as to the importance of dental health. Having convinced it by arguments in its own language that its attitude toward dentistry is unjustified, it cannot doubt any longer the sincerity of the profession in its desire to give the best of services at reasonable fees and at low cost to the patient. It will therefore be better inclined to practice the principles set forth in that education.

With a more receptive mind, two other things must be done to change its dental habits: (1) eliminate the fear of dentistry; (2) adjust the methods of practice.

ELIMINATING PATIENTS' FEAR OF DENTISTRY

The time is now here when it is as

poor practice to do operative dentistry without an anesthetic as it is for a physician to do surgery without one. The economic importance of this fact and its effect on improving the dental habits of the public cannot be overemphasized and ranks second only to the importance of changing the public's attitude with respect to dental costs.

ADJUSTING THE METHOD OF PRACTICE

The foregoing tables and facts have shown how failure to budget, with misappropriation of funds as they concerned basic needs was a fundamental cause of hardship in meeting dental costs. They show also how neglect has added to the cost of dental care to the patient.

I believe that the method of practice about to be suggested offers opportunity for the practical application of these truths for the solution of the problems attendant to the present trends in dentistry. It gives the public what it wants and what it needs. It retains for dentistry the same opportunity to thrive and to develop as it has had in the past. No political or legislative prodding or cramping is involved. It replaces the present *obsolete* method of practice with one in which the practitioner must apply all the scientific developments in the evolution of dentistry. It places dentistry in the strategic position of being able to say to the public, "I can give you what you need at a price that you can pay. Whether you want it or not is up to you. The price that you pay for neglect is your responsibility. Neither society nor the profession should pay it for you."

METHOD OF PRACTICE

A general outline of the method of practice suggested involves naturally, as a requisite: (1) restoration of the patient's mouth; (2) determination of the degree of caries-susceptibility and rate of decay; (3) determination of the probable rate and type of necessary replacements; (4) determination of the effect of the present state of the mouth on future requirements; (5) determination of probable periodontal involvement and treatment; (6) determination of frequency of observation necessary; (7) determination of preventive treatment necessary; (8) determination of cost; and (9) arrangement with the patient. How much of this outline is included in the arrangement that is made with the patient will depend on his desires or his ability to pay, or both. This will be ex-

plained more fully when cost is discussed.

RESTORATION OF THE PATIENT'S MOUTH

No detailed discussion of restoration is necessary. We have observed the cumulative effect of neglect and poor work on the incidence of caries and the preventive value of good operative dentistry as it concerns the recurrence of caries, caries reduction, and periodontal disturbance with their sequelae. This method puts a premium with economic significance on good operative procedure and technique. No charlatan can practice it successfully.

DETERMINING THE DEGREE OF CARIES-SUSCEPTIBILITY AND RATE OF DECAY

Unlike the situation confronting our colleagues of medicine, the dental history of every patient that walks into our offices is like an open book before us. We see the teeth lost; we see the cavities present; we see the size and number of restorations; we see the comparative and relative resistance and strength of the tissues involved. With these as a guide and with the aid of the age of the patient, the frequency with which dental service has been sought in the past and the knowledge of the other dental habits of the patient as evidenced by the type of care given the mouth, we can gain a fairly accurate opinion as to the degree of caries-susceptibility and rate of caries development for each patient. From this we can compute the probable number of cavities that may develop per year.

DETERMINATION OF PROBABLE RATE AND TYPE OF NECESSARY REPLACEMENTS

Accidents cannot be predetermined, of course. But one can foretell by the marginal condition of restorations, the condition of crowns, and so forth, the probable necessity of replacement during a succeeding year. Much of the work of this type would naturally fall into the category of proper repair at the initial stage of care. Any questionable restorations after that should be added to the number of cavities already computed because of caries-susceptibility.

EFFECT OF PRESENT MOUTH CONDITION ON FUTURE REQUIREMENTS

Many abnormalities resulting from former dental care or its lack produce environmental factors that vitally affect future developments in the mouth. Vivid examples of this can be called to mind by every practitioner, such as the effect of shifting

teeth as a result of lost teeth that have not been compensated for, periodontal disorder, unsatisfactory operative results, and so forth.

DETERMINATION OF PERIODONTAL INVOLVEMENT AND TREATMENT

In adults periodontal involvement becomes of increasing importance and must be considered in any program for complete care of the patient.

DETERMINATION OF FREQUENCY OF OBSERVATION NECESSARY

Degree of caries-susceptibility, rate of decay, periodontal involvement, if any, and mouth hygiene habits of the patient will determine this. For some patients once a year is often enough for observation. For other susceptible patients and those needing periodontal care the required frequency will range from once a month to six-month intervals.

DETERMINATION OF PREVENTIVE TREATMENT NECESSARY

No arbitrary program can be outlined, for such treatment will depend on the degree of susceptibility, local environmental factors, systemic involvements, and the increasing and changing knowledge concerning caries derived through research and clinical experience.

DETERMINATION OF COST

It will be seen from the foregoing that the procedure outlined enables one to render the highest type of professional service. It is scientific and practical. But such a procedure also offers opportunity for the greatest economy, for it requires that regular observation and treatment, the lack of which has been shown to be the reason for the present high cost of dental care.

It was stated earlier that the average indicated work for 2319 patients was 6.24 cavities at a cost of \$20.43. It was also stated that the average number of cavities and average cost per patient among 134 patients seen once a year or oftener was 2.5 and \$9.87 respectively. It was emphasized likewise that this result was among the patients most susceptible to caries. This offers convincing evidence that there is a definite preventive value to maintenance of the mouth in good repair as well as the previously mentioned economy of regular treatment.

When opportunity is afforded for the regular application of all the accepted principles of preventive dentistry, the benefits accruing to the patient both as they regard dental health and economy of cost are self-evident. And here is the key that will

open the gate to the promised land for both dentist and patient. *With the cost to the patient based on these determinations, but with the services rendered based on the tenets of preventive dentistry*, the result is the application of the highest type of professional knowledge and skill on the one hand, and the acquisition of the lowest average cost obtainable to the patient, on the other hand.

Furthermore, by merely adjusting its use to the desires of the patient or his ability to pay, one can offer a sliding scale of costs in accordance with any income, low or high.

Clear understanding of the plan and of its flexibility can best be obtained by citing some examples. We will discuss three hypothetical patients: (1) a low-income patient; (2) an average-income patient, and (3) a high-income patient.

THE LOW-INCOME PATIENT

A man, aged 32, presents for treatment. Examination reveals three gold shell crowns, three lost molars, one Davis crown, eight proximal and five occlusal amalgams, and five proximal cavities including one exposed pulp in a bicuspid.

The patient's income, he tells us, is small, so that any dental bill is a hardship and he wants the lowest fee possible under the circumstances. When he is told, however, that his present bill is 45 per cent more than it should have been because of neglect, he is anxious or at least willing to do something constructive if it will save him money in the long run.

We therefore follow the procedure outlined with the following results:

1. In twenty-six years (age minus 6) of his permanent dentition, thirty-nine cavities have developed, or 1.5 per year. This figure is arrived at from questioning him and figuring three cavities to each crowned and each lost tooth.

2. While two of the old amalgams show some marginal defect, no definite harm is apparent, so that no change is made nor is it considered necessary in the next year, inasmuch as the patient's finances require close reckoning.

3. The present state of the mouth would indicate no immediate complicating effect on future requirements.

4. Gingivitis due to poor habits of mouth hygiene and moderate calcular deposits are present.

5. The patient tells us that it is four years since he last had dental service, and that he usually requires such care about that often. This gives

us an idea of the degree of susceptibility, rate of decay, and rate of calculus precipitation. These observations lead us to believe that three appointments four months apart for the following year are advisable.

6. With this in mind, the preventive treatment required in his case is determined.

7. As stated, the patient's yearly average for the development of caries is 1.5. Inasmuch as all the cavities now requiring attention are proximal, his present tendencies point to the fact that predominantly that type of cavity will develop. The cost will be figured, therefore, on that basis, which, at four dollars for an amalgam, is six dollars. With two prophylactic treatments at three dollars, the total is twelve dollars. This is the figure we present to the patient as the cost of dental care for the year following the repair of his mouth necessary at once.

It should be borne in mind that this patient according to the present condition of his mouth and its further reparative requirements is a definitely caries-susceptible patient; nevertheless a dollar a month will care for him during the next year. Compared with the thirty-six dollars needed to meet the present reparative requirements, the cost is modest.

The nucleus and the particular significance of this whole method of practice is this: If the examination has been accurate and the necessary reparative work has been done, the three anticipated appointments will be occupied in preventive measures at a fee commensurate with the present basic rate resulting in a year's head start in prevention against the actual development of caries. This must tend to reduce the tendency to caries in this patient, so that a minimal, fairly regular fee can be quoted later to this patient which will assure him the highest type of service at the lowest cost over a period of years and without reducing the present basic rate of fees of the operator.

THE AVERAGE-INCOME PATIENT

For the sake of clearness and brevity, we will consider the same patient, but place him in a higher income group as exemplified by the vast middle-income class. Our determinations remain the same as far as they went in our considerations for the low-income patient, but we can extend the scope of our preventive treatment to include more operative treatment to correct local environmental factors. Another six dollars added to the previously estimated twelve dollars would enable us to locate and replace those restorations observed with

defective margins and expand our outline of prevention. In other words, instead of performing minimal preventive services, they could be extended and expanded to include all its phases. This can still be done at a nominal cost to the patient and with a reasonable return assured to the operator.

If cavities appear in either case, the fee stated still assures a return to the operator.

THE HIGH-INCOME PATIENT

The patient transferred to the high-income group would have little change as far as method of treatment is concerned. The principal difference would be that a fee would be quoted on a gold basis.

ARRANGEMENT WITH THE PATIENT

In making the complete arrangement with the patient after the cost has been determined, the following important points must be kept in mind:

1. The fee should be quoted as a maximum fee. In the case of the low-income and many average-income patients, the services rendered will probably require all the fee quoted for the year. But in many cases, especially when the fee quoted has been based on gold, a reasonable fee on a time basis will be less than the fee quoted if no cavities develop. For example, if our hypothetical patient with 1.5 cavities or twenty-two dollars and two prophylactic treatments at five dollars or a total of thirtytwo dollars, does not develop any cavities, and the total time in the three appointments was two hours with the basic charge of ten dollars an hour, the patient would be justified in expecting less than the agreed fee being charged, and the operator would be well paid if twenty dollars were all that was charged.

2. The arrangement made and the fee quoted should be made for one year at a time. Any adjustments equitable to changing conditions and requirements can then be made satisfactorily to both patient and dentist.

3. While the cost is based on possible restorations and treatments, with the concept of treatment predominantly preventive in character, no arrangement with the patient should include specific details of treatment in terms of cavities, restorations, and so on. With a satisfactory fee quoted, the operator is then in a favorable position to enjoy full opportunity to apply his knowledge and skill according to his own judgment. I am tired of being limited in

the application of my skill and knowledge by the desires, the dictates, or the dollars-per-filling ability of the patient. With this method the patient becomes my responsibility and the proving ground of my professional ability.

ADVANTAGES OF METHOD OF PRACTICE

There are ten principal advantages to this outline of procedure, as follows:

1. It puts dentistry in a strategic position and *places the public on the defensive* with regard to both cost and use of dental services by enabling the profession to say, "We can give you what you need, at a fee you can pay, if you follow our advice."

2. It stresses preventive dentistry rather than reparative dentistry, thereby meeting the demands of the evolutionary advancement of the science of practice.

3. It is flexible. *It can meet any income, and can be adjusted to any scale of fees.* I would not hesitate to care for any patient regardless of his degree of susceptibility for between fifty cents and a dollar and a half a month (\$6.00 to 18.00 per year) on an amalgam basis. The higher the fee quoted, the greater the opportunity to offer intensive preventive treatment.

4. It affords the patient an opportunity to budget his dental expenses, thereby eliminating the principal cause of hardship involved in dental cost—failure to do so.

5. *The individual care and personal relationship of the family dentist are retained.*

6. It makes possible more stable conditions of practice and income for the dentist.

7. *It will eliminate charlatanism.* The exploiter and the careless cannot practice this method.

8. *It involves no radical or complicated change in the present system of rendering professional service.*

9. No change in the present basic rates of fees is necessary.

10. It enables dentistry to maintain its dignity and progress.

CONCLUSION

With the public seeking dental services with an attitude changed through proof with actual facts; with that proof showing that the true economy of dental care lies in the proper use of professional services; with the price of neglect the primary obligation of the culpable patient alone and not of the state or of the profession—with these conditions, dentistry can utilize modern ad-

(Continued on page 263)

OSTEOMYELITIS OF THE JAW

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OSTEOMYELITIS is an infection of the bone and bone marrow. Inflammation in the bone and soft tissue is essentially the same, with one exception. Soft tissue readily expands, but in bone, because of its unyielding nature, necrosis results. Bone changes, such as necrosis, caries, and sclerosis, are results of inflammation and must not be confused with the pathologic processes leading to them nor should they be described as distinct diseases.

Osteomyelitis may (1) originate in the blood stream; (2) it may be a direct extension from the soft parts (such as in the case of an acute ulcerative stomatitis); (3) it may have its etiology in open wounds of the bone (such as occur in fractures).

CONDITIONS THAT MAY BE FOLLOWED BY OSTEOMYELITIS

1. Extraction of acutely infected teeth before localization has taken place. (In a study of more than 100 cases, I have concluded that 75 per cent of the cases of osteomyelitis of the jaw are produced in this manner.)

2. The injection of anesthetic solutions into inflamed areas.
3. The use of hydrogen dioxide or other effervescent mouth washes after extraction and fractures.

4. Acute ulcerative stomatitis, scarlet fever, measles, or small pox.

TYPES OF OSTEOMYELITIS

Osteomyelitis is classified as either localized or diffuse. Either type may be acute or chronic.

Acute Diffuse Osteomyelitis—The acute diffuse form begins in the cancellous tissue and is usually followed by vascular engorgement, edema, leukocytic infiltration with necrosis of both cancellous bone and bone marrow. It may extend directly through the cortical plate and the periosteum, or it may strip up the periosteum and destroy the underlying bone. After the disease has ceased to spread in the bone, the changes in the subacute stage which follows are usually of a reparative nature. If early adequate drainage has been established, these changes begin early and progress rapidly. The infection may be localized in from six days to

two weeks, but in extensive cases, it may require a longer time.

The patient usually complains of severe pain and has a high temperature. At the onset there is little or no local edema. As the case progresses, however, the part soon becomes swollen and the cardinal signs of inflammation appear. On localization and drainage and the subsiding of the acute symptoms the soft tissues do not usually return to their normal contour so readily as in an acute alveolar abscess, but a hard infiltration of the soft tissue persists and there is a continual discharge from the wound. There is little or no discomfort suffered during this stage of the disease. This condition may persist for months and even years until the sequestra are dissolved or removed.

Acute Localized Osteomyelitis

The changes that take place in the acute localized form of osteomyelitis are the same as in the diffuse osteomyelitis but they remain localized. The necrotic bone is rapidly absorbed; pus and granulation tissue form, and an abscess appears. The inflammatory reaction extends to the surrounding cancellous bone and periosteum resulting in a variable amount of both periosteal and endosteal bone formation. The acute reaction subsides but the cavity persists. The cavity usually becomes lined with fibrous or granulation tissue. Pus may remain for indefinite periods, or it may be replaced by a serous exudate in which the gross lesion at operation may be similar to that of a bone cyst. The wall and surrounding bone usually become moderately sclerotic.

Diffuse Sclerosing Osteomyelitis

Sometimes there is a low-grade infection when the exudate is small in amount and is of a serous or mucous nature rather than of a purulent type. There is little bone destroyed and the exudate usually disappears without drainage. This condition is often present around a chronically infected tooth and is indicative of a low type of infection.

PATHOLOGY OF OSTEOMYELITIS

Pyogenic infection in bone produces the same types of reaction as

pyogenic infection in soft tissue, but the results are different because (1) of the presence of the inorganic lime salts which limits the spread of the infection; (2) the results persist long after the acute inflammatory reaction subsides inasmuch as the partial defects from loss of bone are not filled in so rapidly as in the case of infection of the soft parts, and (3) of the rigidity of the bony walls and their inability to collapse.

Necrotic bone is absorbed by the action of granulation tissue which springs up about its margins, both dead and living bone being removed along the line of junction. When the dead bone is of a small amount the granulation tissue gradually absorbs it entirely, and a cavity is left behind. When the dead bone is present in great amount, it detaches from the living bone as a sequestrum. The zone of demarcation between dead and living bone is jagged and irregular in outline. Grooves are formed along the endosteal and periosteal surfaces at the limits of the dead bone and they are gradually deepened until separation takes place.

Necrotic bone is attacked by granulation tissue soon after the onset of an infection and gross evidences are manifest in from seven to fourteen days. The time that is required for sequestration is variable according to the density of the bone involved. The liquefaction of necrotic bone proceeds at a much slower rate after sequestration is complete. The density of the dead bone remains unchanged and is greater than the new bone which is laid down because the latter is spongy in structure. It is also greater than older living bone which undergoes partial atrophy from the disease process and disuse (an important point in roentgenologic diagnosis).

New bone forms from the periosteum in the region of the infection. Surviving periosteum about the dead bone forms a new layer of bone which is called the involucrum. The involucrum gradually increases in density, forming a new part. If the covering of periosteum is destroyed by the infection, the involucrum is absent. Fortunately in most cases involving the mandible and maxilla, only one plate of the bone is involved. The re-

maining healthy part retains the continuity of the arch and lays down new bone. Wolfe's Law called attention to the principle that the contour and density of a bone are the result of the stress and strain applied to it functionally, and this principle is often illustrated in the jaw. The recognition of this fact also aids in the treatment of these cases.

Periosteal bone is usually deposited along the cortex, beyond the ends of the necrotic bone. After three or four weeks of infection one can begin to demonstrate this new growth in the roentgenogram as a hazy or cloudy line surrounding or partly surrounding the necrotic bone and extending over onto the living bone. This at first is faint, but with the progress of the disease, this area gradually becomes larger, and in time takes on the appearance of bone. This new growth is the involucrum. If the infection has been treated properly; if wide incision and drainage have been instituted, and if the sequestra were removed when separated, one finds that new bone formation gradually takes place until the former continuity and shape of the bone are restored.

As the healing continues there is a transformation in the old bone beyond the limits of the infection which brings about the alinement of the shaft and the involucrum. Healing

may take place within a few months when the operation has been properly performed, but in many cases the disease passes into a chronic stage with discharging sinuses often persisting and with recurring attacks of a mild nature over a long period.

TREATMENT OF OSTEOMYELITIS

1. Early drainage of the focus should be established with the least possible operative trauma.

2. The operation should wait until the virulence of the infection has subsided; until the necrotic bone has spontaneously separated and sufficient new bone formed to maintain continuity before attempting any radical operation.

3. At the proper time remove all fragments of necrotic bone with the least amount of harm to the granulations lining the beds. When practicable, remove all edges of live bone that overhang, so that the soft tissue can drop into and fill these defects.

If this program is faithfully and intelligently followed the disease will seldom prove fatal or progressive.

COMMENTS

1. A single sequestrectomy will usually be followed by permanent healing.

2. Patience must be exercised by the surgeon in charge if the case is to be handled properly. Acute diffuse osteomyelitis of the jaw and the

chronic stage which follows are usually of long duration. It cannot be hurried and must be treated by adequate drainage in the acute stage and sequestrectomy in the chronic stage. If the entire body of the jaw is involved, the sequestrectomy should not be performed until the involucrum is strong enough to maintain the continuity of the part. No better splint can be made than that furnished by the sequestrum, and, in some cases, it is even advisable to wire it in place if necessary.

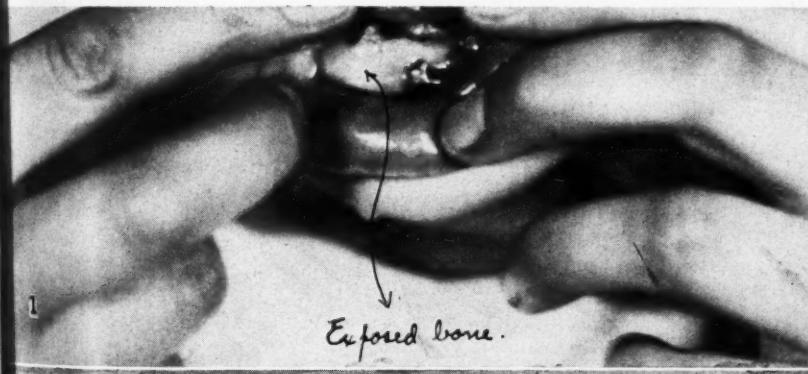
3. It is often not necessary to remove teeth in the necrosed area. Several authorities have reported cases in which the teeth and tooth buds which were definitely surrounded by

Fig. 1—Case 1—Extensive soft tissue destruction with the entire body of the mandible exposed from left cuspid to right molar. The crypts of the deciduous teeth may be seen along the crest of the sequestrum.

Fig. 2—Case 1—The typical hard inflammatory swelling of the affected part; this often persists for years after the cessation of the disease.

Fig. 3—Case 1—The sequestra were removed at time of operation; the condyle is intact. The missing sections between the condyle and the body of the mandible had broken away. It is interesting to note, however, that this case had an excellent functional result.

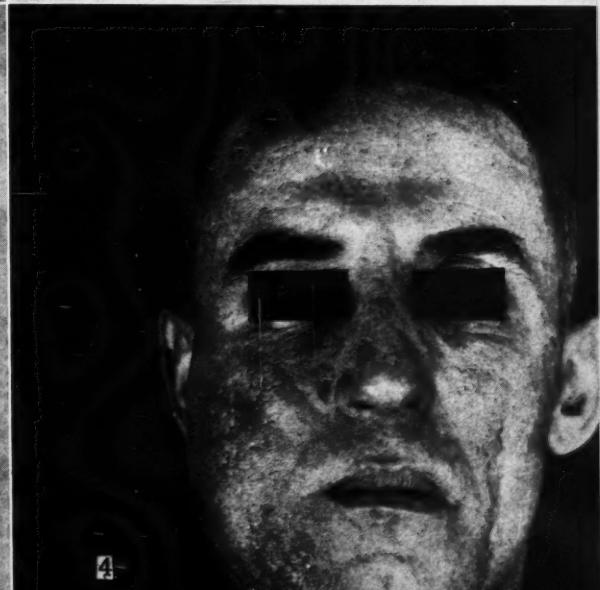
Fig. 4—Case 3—The hard edematous swelling characteristic of chronic diffuse osteomyelitis. Just to the right of the symphysis can be seen the healed extra-oral incisions.



Exposed bone.



2



4

necrotic bone later became fixed in the newly developed jaw with a final result of vitality, solidity, and serviceability.

4. In the treatment of localized osteomyelitis more radical methods can be used. In the acute cases immediate drainage is indicated. As soon as the acute symptoms subside, I see no contra-indication for operation and the removal of infected tissue. I do not believe that it is necessary to curet these areas radically.

5. We often see in edentulous areas and around chronically infected teeth areas of condensing osteitis. These are defensive tissues and not infective, and the radical operation of them must be scorned. Such areas of condensing osteitis in edentulous areas are usually healed processes from old infections.

REPORT OF CASES

Case 1—J. C., aged 4 years, presented November 11, 1928, with a history of a toothache followed by swelling of the right side of the face two weeks previous. This condition improved somewhat until three days before admission when the left side of the face became swollen and the lower anterior teeth became loose and fell out.

Examination—On admission the patient presented all the cardinal signs of inflammation of the lower jaw, more marked on the left side. The gums and mucosa adjacent to the lower left bicuspids were sloughing and necrotic. In the lower anterior region the jagged edges of bone showed through a sloughing mass of tissue. A smear made at this time was negative. Under routine treatment the acute symptoms subsided and the edema of the left jaw disappeared. The right side of the face, however, remained swollen and there was a continual discharge of pus around the edges of the bone of the mandible which was exposed from the left cuspid to the right molar region (Figs. 1 and 2).

A roentgenogram taken December 5, 1928, shows the sequestra and the first indications of new bone formation. The mouth was irrigated twice daily and the sequestra were left entirely alone. At the end of two months, February 5, 1929, the involucrum had become much larger and heavier and the sequestra were loose.

Operation—As the involucrum was considered strong enough to retain the jaw in normal relationship, the patient was operated on and the sequestra were removed. The operation included the entire thickness of the mandible from the left cuspid region to and including the right condyle (Fig. 3). The patient was discharged February 15, 1929. All drainage had ceased and the area was completely healed.

Comment—This was a case of an osteomyelitis of the jaw following an acute ulcerative stomatitis. The family lived in unhealthy surroundings. Had the patient been operated on as soon as the necrotic bone was demonstrated, I believe he would have been disfigured for life. By retaining the sequestra in place until the involucrum had developed sufficiently to support the jaw, not only was

asymmetry of the face prevented but a foundation was assured for later prosthetic restoration of the teeth.

CASE 2—J. Z., a man, aged 36, presented December 5, 1928.

History—Four weeks previous the patient had had two teeth extracted on the lower left side. They had been causing considerable pain and the jaw was swollen and tender when the extraction was done. After the extraction the swelling increased and the patient had a considerable discharge of pus into the mouth from the unhealed sockets. A roentgenogram dated December 5, 1928, showed a marked destruction of the left side of the jaw extending from the third molar to the cuspid region with the typical moth-eaten appearance of osteomyelitis.

Operation—An operation was performed December 20, 1928, under local anesthesia. An incision was made beginning posterior to the third molar buccally and extended forward around this tooth along the crest of the alveolus to the cuspid, then downward and mesially to the lowest part of the mucobuccal fold. The mucoperiosteum was raised from the bone on the buccal to the lower border of the mandible throughout the entire length of the incision; the cavity thus formed was packed with iodoform gauze.

Course—The cavity was irrigated and the dressing changed every two days. Small sequestra were removed from time to time as they became loose. The largest piece removed was about 1 by 3 cm. As the cavity became smaller the size of the pack was correspondingly decreased until February 7, 1929, when the area was completely filled.

Comment—This was a typical case following extraction in the acute stage of the infection. I cannot stress too strongly the advisability of limited surgery in acutely infected cases. If in doubt one should always localize and drain before attempting extractions.

The method of handling this case differs from Case 1 in that the entire thickness of the mandible was not involved; early operation was indicated to allow for sufficient drainage and the removal of sequestra as they formed.

CASE 3—History—J. C., a man, aged 37, presented April 23, 1929, with a history of severe pain and swelling in the lower right molar region which occurred about the first of February. The patient had gone to a dentist and had had the lower right second molar extracted. Three days later his face became greatly swollen. A physician treated him until March 1, 1929, when two abscesses pointed on the face. These were incised and drained. The abscesses drained more or less continuously with an occasional exacerbation until April 23, 1929, when the patient came to me.

Examination—An indurated swelling of the right jaw extended from the angle to the symphysis and from the zygoma above to just below the interior border of the mandible below (Fig. 4). A draining sinus appeared about 2 inches distal to the symphysis on the right side and another sinus, almost healed, was noted in the region of the angle. The molars were missing on the affected side and there was a draining sinus on the crest of the ridge in this region. Denuded bone could be probed through this sinus.

A roentgenogram taken May 23, 1929, shows a marked honeycombed appearance of the bone from the cuspid to the articulation.

Slight crepitus in the molar region was indicative of a pathologic fracture. The jaw deviated slightly to the right on opening the mouth.

The Wassermann reaction was negative.

The patient suffered little or no discomfort at this time and was regularly at work.

Treatment—On June 11, 1929, the area was incised intra-orally from the angle to the cuspid, and the mucoperiosteum was raised from the bone. The cavity thus formed was packed open with iodoform gauze.

Course—Small sequestra were removed from time to time. The external sinuses soon healed and the patient progressed satisfactorily.

Comment—Osteomyelitis of this type often presents a prolonged course of treatment. This is another case of inopportune extraction in the face of an active infection. A complete destruction of the jaw is often apparently present from roentgenographic examination, but fortunately, the majority do not involve the entire thickness of the jaw. A radical operation was suggested for this patient but I am of the opinion that patients recover in about the same length of time if they are handled conservatively. Considerable disfigurement would no doubt be caused by extensive operation.

CASE 4—A man, aged 73, presented March 18, 1929, with a large swelling of the right jaw and a copious discharge of foul pus from an intra-oral sinus in the right third molar region. The patient stated that three weeks previous he had had extreme difficulty in urination and at one time passed a large quantity of pus. A few days later his right jaw began to swell and had continued swelling until an abscess opened into his mouth. He had no history of a blow or injury to the part at any time. The lower jaw had been edentulous for twelve years, and roentgenographic examination revealed no root fragments or other etiologic factors. The patient was referred to the genito-urinary department where a cystoscopic examination revealed an infected hydronephrosis and old stricture.

Treatment—Wide incision was made for drainage and the wound was packed open and irrigated daily. A roentgenogram taken March 18, 1929, showed only slight evidence of bone change. On April 24 a large sequestrum was exfoliated which included the entire thickness of the mandible for a distance of about 3 cm. and resulted in a pathologic fracture.

The fracture was not reduced as there was little or no displacement; the patient was instructed to rest the part and partake of a soft diet.

Course—Six weeks later, June 11, new bone formation was clearly seen bridging the fracture (Fig. 5). Five months following the acute infection, August 29, the patient was discharged with a good anatomic and bone union present (Fig. 6).

Comment—This was undoubtedly a case of metastatic osteomyelitis of the jaw resulting from the kidney infection. The rather remarkable feature of this case is the result inasmuch as the patient was 73 years of age and the bone bridged a space of about 2 cm. The only local treatment was wide incision and drainage. He was, of course, under constant care and treatment by the attending urologist.

In considering the focal infection, it is seen here that it is not always that the

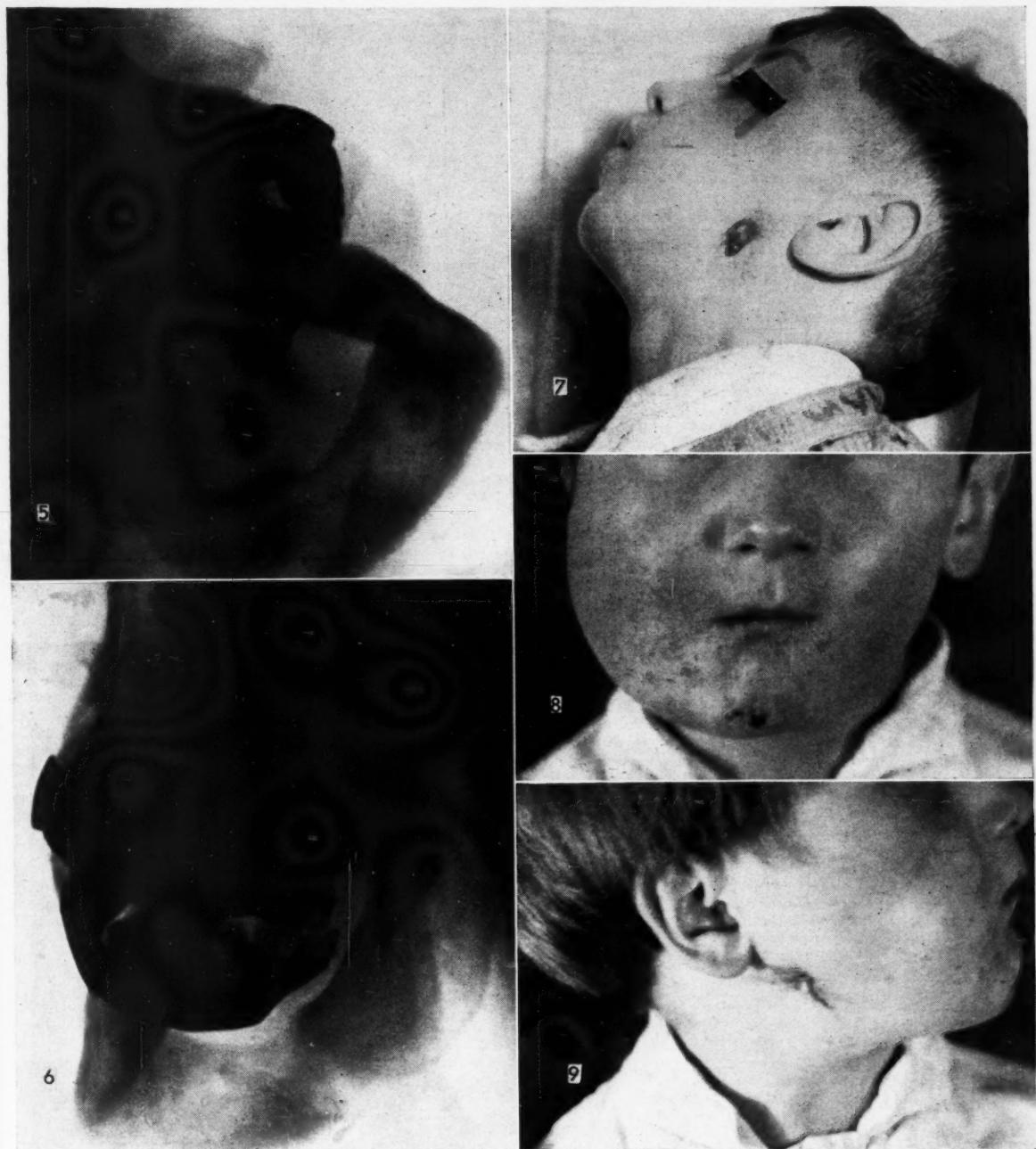


Fig. 5—Case 4—New bone formation can be seen bridging the gap between the fragments. Six weeks after acute attack.

Fig. 6—Case 4—Five months after operation. The gap is completely bridged by new bone formation, a firm union resulted.

Fig. 7—Case 5—The typical appearance of a chronic discharging sinus in osteomyelitis of the jaw.

Fig. 8—Case 6—Another typical osteomyelitis with hard edematous swelling in a child. These edematous areas in the chronic stages are not painful nor do they show any of the signs of acute inflammation.

Fig. 9—Case 6—Draining sinus on the foci. By following this tract with a probe denuded bone can be felt, and the location of the sequestrum approximated.

teeth and their adjacent structures are the seat of the foci and that focal infection can work the other way around in affecting the teeth and their supporting tissues.

CASE 5—A boy, aged 10, presented March 13, after having been treated unsuccessfully for seven months for a chronic osteomyelitis of the left ramus of the mandible. The etiologic factor was undetermined.

Examination—There was a draining sinus present on the left side of the face opposite the angle of the jaw (Fig. 7). Intra-orally the tissues appeared healthy. A roentgenogram taken March 13 showed a large sequestrum in the anterior border of the ramus circumscribed by dense bone.

Operation—The patient was operated on extra-orally and the sequestrum removed. It was found lying in a crypt in the body of the ramus which was lined with granulation tissue. The cavity was packed with gauze and the dressing changed daily.

Postoperative Treatment and Course—Generalized irradiation with ultraviolet was given postoperatively and the diet watched. In six weeks' time following operation the sinus on the face had healed and the patient was discharged as cured.

Comment—Case 5 represents a type of osteomyelitis that is often seen in children. It usually begins as an acute diffuse type which later becomes chronic and then localized. There are often only about two large sequestra which cannot be exfoliated because of the location. They become surrounded by granulations and may discharge for years if the necrotic bone is not removed. After operation ultraviolet irradiation is of assistance in drying the discharge from the wound.

CASE 6—A boy, aged 7, presented February 4 with a history of a chronic osteomyelitis of the right jaw over a period of one year. The etiology was uncertain.

Examination—There was the typical appearance of a chronic osteomyelitis of the right jaw with an extra-oral sinus in the region of the angle discharging a small amount of pus (Figs. 8 and 9). Intra-orally there was a large sequestrum protruding from the gums in the right lower molar region, and the molar was loose.

Operation—Operation was performed February 7, and the sequestrum removed. The anterior border of the ramus was then exposed, and it was found that a large portion of the external plate of the ramus, down to the lower border of the mandible, was necrotic. This was cleaned and the cavity was packed for about six weeks. The extra-oral sinus healed and the patient was soon dis-

charged. Ultraviolet irradiation was used in this case to help dry the postoperative discharge.

Comment—It is difficult to maintain drainage when the disease is in this location; also when sequestra form they are difficult to remove. The predominating etiologic features of this case was lack of mouth hygiene, malnutrition, and unsanitary living conditions. The child came from a poor family. The use of generalized ultraviolet irradiation in these cases is beneficial in reducing exudation and assisting metabolism.

CASE 7—A woman, aged 32, presented in March, 1930.

History—In July, 1929, a tonsillectomy had been performed. Four days following operation the patient developed bilateral peritonsillar abscesses which were localized and drained. The left side soon healed but the infection persisted on the right. A trismus was present and the surgeon, desiring to examine the throat, gave the patient a general anesthetic and forced the mouth open. This was followed by an acute exacerbation of the right side which localized and was drained extra-orally.

Examination—A small amount of exudate continued to discharge after the acute attack and was present when I saw the patient in March, 1930. At this time there was a decided displacement of the mandible to the right and distally with considerable limitation of movement. Roentgenographic examination disclosed a pathologic fracture of the neck of the right condyle with sequestration of the entire posterior half of the ramus.

Operation—A sequestrectomy was done and the surgeon removed the head of the condyle against our advice. Upper and lower hooked arch wires were inserted and intermaxillary force was applied on the right lower jaw in the hope that we might draw it forward into occlusion, and also, stimulate bone repair. These were left in place until June 8, 1930, when they were removed. The occlusion was almost normal although the jaw deviated slightly to the right and distally on opening.

Comment—I believe that the forceful opening of the mouth in the presence of the throat infection was an error and a predisposing cause of the osteomyelitis. The second mistake in the case was the removal of the condyle at the time of operation. The periosteum being destroyed and the condyle removed there remained no bony bridge over which repair could take place; therefore the patient is without a condyle. There is no doubt that if the condyle had been left in place an anatomic and functional jaw would have resulted. As it is, the patient can only open her mouth about

1 inch and the left lateral and incisive bites are restricted. The application of the arch wires and intermaxillary force was a distinct aid in overcoming the displacement of the jaw and allowed for the filling in of scar tissue behind the ramus sufficiently to hold the mandible in centric relationship in repose.

CASE 8—H. C., a man, aged 42, presented May 15, 1930, with a draining sinus on the crest of the ridge in the lower right first molar region which had been present two and a half years. He had had several more or less severe exacerbations and had received dental treatment from time to time. He suffered little or no discomfort from the area except in its acute stages. A roentgenogram taken at presentation shows a chronic localized osteomyelitis with several old sequestra in the area surrounded by sclerotic areas.

Treatment—A long elliptical incision was made from molar to bicuspid and the area thoroughly cleaned. It granulated rapidly and within three weeks was completely healed.

Comment—Case 8 exemplifies a simple case of chronic osteomyelitis in which the old sequestra had never been removed. Here was a condition that was present two years and a half and still parts of the original necrotic bone remained. It is one of the few types of osteomyelitis in which a cure may be used to advantage.

CASE 9—A woman, aged 65, presented with a small fistula on the lower edentulous ridge.

Examination—Roentgenographic examination revealed no etiologic factor, such as root tip, cyst, or foreign body. Further roentgenographic examination of the skull showed these areas to be prevalent in the skull bones.

The Wassermann reaction was positive. The patient was also suffering from an interstitial keratitis.

Comment—It is not always wise to jump at the conclusion that every osteoporosis is a definite osteomyelitis of that area. In all cases in which no etiologic factor can be found, a history of syphilis should be sought.

CONCLUSION

Osteomyelitis of the jaw is a distinct problem for the oral surgeon. The involved surgical principles are the same as for an osteomyelitis in any other bone of the body, but it cannot be treated radically without frequent tragic results. The fact that the entire body of the bone is often involved calls for rare judgment and dental knowledge if disfigurement is to be prevented.

A COMPARISON OF PERIODONTAL ATTACHMENT LEVELS: ANTEROPOSTERIORLY

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EVERY practitioner in dentistry has been guilty at some time or other of destroying the normal height of the periodontal attachment by excessive trauma during operative procedure. This article is a plea for greater care in operating and for more careful consideration of this important anatomic detail, the normal periodontal attachment, mesial and distal.

Fig. 1 illustrates a familiar type of carelessness. After a porcelain jacket crown is placed on an anterior tooth, the gum festoon fails to return to its normal contour, leaving the interproximal space on each side devoid of its gingival papilla. In such a location, the appearance is noticeable even to the layman. The result is a failure from the standpoint of esthetics, and it creates an abnormal situation conducive to future periodontal infection.

In our armamentarium the carborundum disc, when improperly used, has been one of the greatest offenders. I do not mean that this useful invention should be discarded. The carborundum, or so-called separating disc, has been a boon to us as modern operators. It functions smoothly and efficiently and is relatively painless and without vibration. Nevertheless, one must always remember that in principle it is really a small circular saw as well as a grinder, and it is just as capable of leaving destruction in its wake as its larger prototype.

One of our carborundum discs is called the "safe side" disc. On examination one side of the disc appears relatively smooth when compared with the abrasive or "unsafe" side. In actual use, however, the "safe" side will likewise be found to be abrasive except that it cuts more slowly and with greater frictional heat than the more efficient side. The so-called safe feature must be disregarded as such. I prefer this type, however, because it is thinner, and is less likely to be eccentric or "wobbly" in use.

Fig. 2 shows how easy it is to strip a high periodontal attachment while using a carborundum disc. The operator, unless he is careful, may pro-

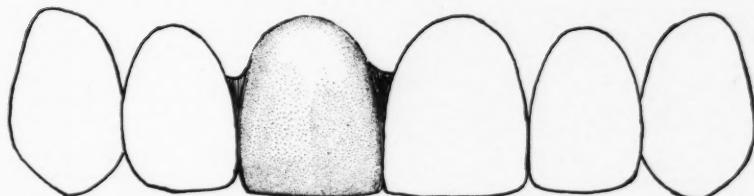


Fig. 1—Loss of gingival papilla following insertion of porcelain jacket crown.

ceed with the slicing of a proximal surface until the edge of the stone disc is on a line with the highest gingival curve to the labial. If he does so, and the attachment is normal, he is apt to cut away and actually lower the periodontal attachment from 1 to 3 mm., depending on the tooth. The extreme curvature of the cemento-enamel juncture should be noted in the illustration. The photograph portrays the mesial aspect of an average upper central incisor. The drawing of the same tooth is used to illustrate the relationship of its cervical curvature to that of a carborundum disc in use. The curvatures are such that the disc will have its curvature directly counter to the cervical curvature of the crown. This fact must be kept continually in mind. It will be necessary to probe often, thereby ascertaining the actual height of attachment in order to keep the rapidly revolving wheelstone sufficiently away from it.

The use of the carborundum disc is being emphasized because it is destructive if it is used carelessly. It is by no means the only offender. Anything the dentist uses that will cut,

scrape, or destroy tissue when employed on proximal surfaces of the teeth can do permanent injury; for instance: metal impression bands, crown bands, burs, stones, scalers.

The operator should be familiar with this phase of dental anatomy; then, with ordinary care, all will be well.

The height of normal gingival tissue around and between the teeth is directly dependent on the height of the periodontal attachment. Any variation brought about through accident or infection will change the gingival contour correspondingly. This explains the premature loss of the gingival papilla between the teeth after some restorations are inserted. Again, it should be emphasized that during restorative operations a probe should be carefully used in order to check the actual attachment.

WHAT IS THE NORMAL ATTACHMENT FOR MOST TEETH? HOW DO THE MANDIBULAR TEETH COMPARE WITH THE MAXILLARY? HOW DO THE ANTERIOR TEETH COMPARE WITH THE POSTERIOR?

Normal periodontal attachment,

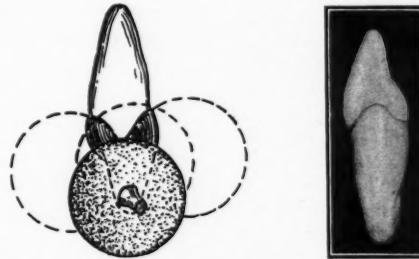


Fig. 2—The photograph shows the mesial aspect of an average upper central incisor. The drawing of the same tooth illustrates the relationship of its cervical curvature to that of a carborundum disc in use.

mesially and distally, follows the cemento-enamel juncture, therefore a comparison of the cervical curvatures, mesially and distally, of extracted human teeth will tell us what we want to know.

The points at which curvature is measured is shown in Fig. 3. It is impossible, of course, to measure the curvature in the mouth and do it accurately without injury. The amount of free gum margin in a normal person, especially a young person, and the complications of proximal surfaces in contact, and firm rubbery tissue in the interproximal spaces would interfere with the use of any sort of calibrating instrument.

Calibration of extracted teeth is a better aid in making more accurate observations of individual tooth anatomy than to attempt to measure the teeth *in situ*.

The extent of curvature seems to depend on the height of the contact point above the crown cervix and also on the diameter of the crown, labiolingually or buccolingually. In using the words "height" or "above" the supposition is made that in either the upper or lower arch the working surfaces of the teeth are "above" the cervixes. Any point approaching the incisal edge or occlusal surface of a crown, therefore, is above the cervix and increases in height as it approaches the working surface.

The periodontal membrane seems to be attached just about as high on lower teeth as on the upper. Although the lower anterior teeth average a millimeter or less in labiolingual diameter (with the exception of the lateral incisors), the contact points are higher accordingly, being almost at the incisal edges. Consequently, calibrations will show less than a millimeter of variation between maxillary and mandibular teeth in the anteriors. There is no variation in the posteriors.

Figs. 4 and 5 show outline drawings of the teeth of one side of the arch when viewed from the labial and buccal. These outlines have been placed diagrammatically, so that a direct comparison may be made with the graphs below them. The graphs demonstrate the relative height of individual attachments in the average normal case. They are based on cases having upper central incisors with crowns 10.5 to 11 mm. cervico-incisal diameter. Unless the teeth are very large or very small, the graphs would not vary from those illustrated by more than one half a millimeter.

The curvature of the cemento-enamel juncture will be about a mil-

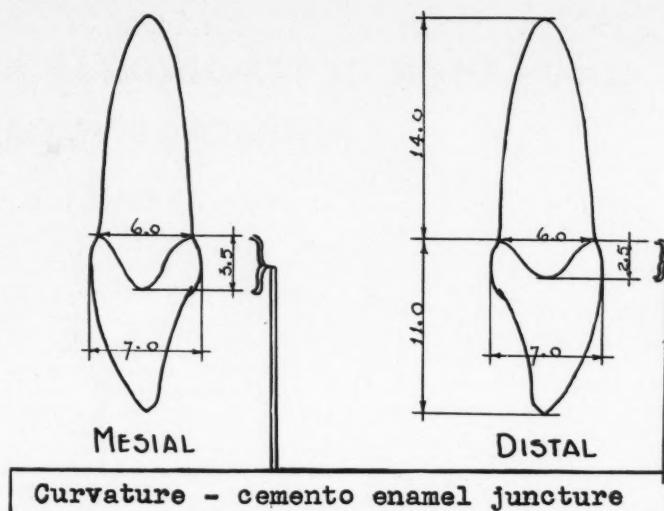


Fig. 3—Points at which curvature is measured.

limeter less on the distal side of a tooth than on the mesial. This observation runs rather true to form although no uncompromising line can be drawn while comparing any anatomic dimensions. If the upper central incisor, therefore, measures 3.5 mm. curvature to the mesial, then the distal will have about 2.5 mm. curvature.

In order to secure scientific data regarding comparative curvatures, it was necessary to obtain groups of tooth specimens from individual patients. It was discovered that usually

a graph of the curvatures from the median line distally would be staggered as in Figs. 4 and 5.

MAXILLARY TEETH

The mesial side of the upper central incisor will exhibit the greatest curvature to be found. The distal curvature will be about 1 mm. less, as has been mentioned.

The lateral incisor will have a curvature on its mesial side about the same as the distal of the central, if it is a lateral in good proportion with its central. The distal curvature will

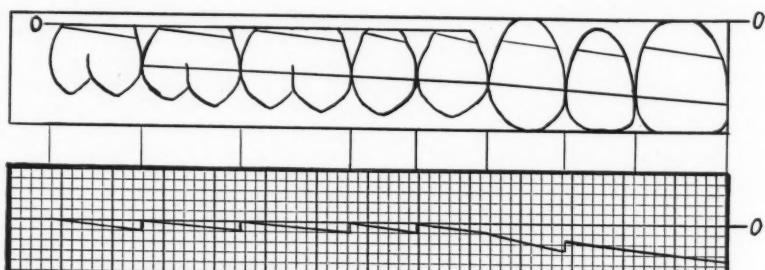


Fig. 4

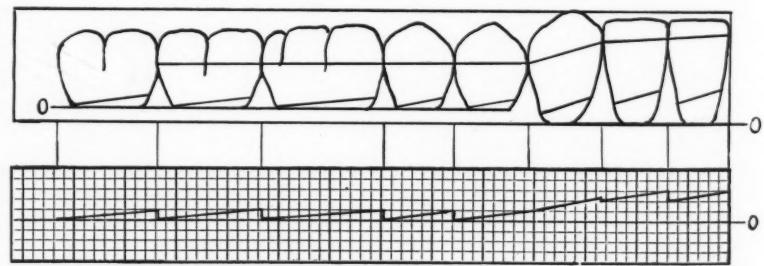


Fig. 5

Figs. 4 and 5—Outline drawings of teeth of one side of arch, viewed from labial and buccal. Graphs show usual variation in height in millimeters of periodontal attachment, mesial and distal. Fig. 4 shows maxillary teeth. Fig. 5 shows mandibular teeth.

be about a millimeter less than that. It should be remembered that the curvature depends on the size of the tooth, which proportion, of course, governs the dimension of the interproximal space between it and its neighbor. The function of the periodontal attachment is to preserve the normal height of the gum festoon, thereby keeping the interproximal space filled.

The upper cuspid, since its crown form is that of an anterior tooth in its mesial half and a posterior tooth on its distal half, has curvatures accordingly. Since the contact point is higher on the mesial, the curvature is as great as the mesial of the lateral. Distally its contact is lower to correspond with the mesial aspect of the upper first bicuspid; therefore, its attachment to the distal is lower also.

Bicuspid and molars are rather uniform in curvature. Since contact points are low in relation to total crown length, it is not necessary for them to have a high periodontal attachment. Careful analysis shows the average bicuspid or molar to have a curvature of approximately 1 mm.

Missouri Theatre Building.

on the mesial and none on the distal. If greater curvature is found on the mesial it will be no more than a fraction of a millimeter. Some molars will have a minus curvature, a fraction of a millimeter on the distal, and will show the cemento-enamel juncture almost straight across the mesial with little or no curvature.

MANDIBULAR TEETH

The mesial side of the lower central incisor, in many cases, has a curvature as great as the upper central incisor, depending on the relative length of the crown and the type of tooth. The height of attachment on the average lower central is probably about half a millimeter less. The distal is, of course, about 1 mm. less than that.

Since the lower lateral incisor has a crown as long as the central (usually a trifle longer) the interproximal design between them demands a high attachment on the mesial of the lower lateral incisor also. The height of attachment is approximately the same, both mesially and distally, as the lower central incisor.

The lower cuspid is similar to the upper cuspid in form. The curvatures, mesial and distal, are also similar. Sometimes we find lower cuspids with crowns much longer than the corresponding upper and with higher contact points as a direct result. In these cases the height of the periodontal attachment, mesial and distal, may be as much as a millimeter greater.

Lower bicuspids and lower molars have cervical curvatures identical with upper posteriors with the same slight variations.

CONCLUSIONS

Periodontal membrane attachments are at their highest points at the median line. In distal progression the height of attachment decreases gradually until the mesial of the first bicuspid is reached. Curvatures will be slight from this point through the third molars.

It is interesting to compare the height of periodontal attachment on the various teeth with a line drawn which bisects the contact points (Figs. 4 and 5).

THE COST OF DENTAL CARE: ITS SIGNIFICANCE IN PRESENT TRENDS IN DENTISTRY

(Continued from page 255)

vancements in its science as the business world has done: to bring the enjoyment of the benefits of its services within the income and reach of all. The facts and plan given here

can achieve this. Thus gaining this end, the most significant factor involved in the present trends in dentistry—the cost of dental care—will have been eliminated as a problem to

the credit of the profession rather than to its stifling degradation and economic hobbling through compulsory health insurance or any other type of social or political legislation.

204 State Bank Building.

TREATMENT OF FRACTURES OF THE MANDIBLE AND MAXILLA

JOSEPH E. SCHAEFER, M. D., D.D.S.

Chicago

FRACTURES of the mandible and maxilla are primarily mechanical problems.

1. *Interdental Splints*—As the bones of the mandible and maxilla are the bearers of the teeth, these fractures lend themselves to ideal treatment through the use of interdental splints. These fractures belong to the field of dentistry.

2. *Barton Bandage*—The general surgeon is limited in his treatment of these fractures to the use of a Barton bandage or to an open operation by direct wiring. Both of these methods obviously are extremely limited in their application. It is true that a simple fracture of the mandible without loss of occlusion lends itself to treatment with a satisfactory result by the use of a Barton bandage, which is the application of a figure-of-eight bandage applied to the face and head.

How many fractures of the mandible are of the simple type? There is an increasing number of these fractures resulting from automobile and airplane accidents. In both, the forces producing the injuries are extremely violent in character and usually leave badly comminuted fractures with extensive injuries of the soft tissues; hence, a Barton bandage is incapable of producing sufficient immobilization and cannot bring greatly displaced fragments into proper alignment. In other words, the application of a Barton bandage to a comminuted fracture is apt to increase the malalignment of the fragments.

3. *Direct Wiring Technique*—The other method of the general surgeon is the direct wiring technique. In addition to the danger of producing a bone infection ending in a non-union or sequestration, this method is also extremely limited in its application and of no value in a badly fragmented fracture of either jaw; consequently, fractures of the jaws definitely belong to the field of dentistry.

4. *Wiring for Immobilization*—The most universally applicable method of dealing with these fractures when teeth are present is to wire the teeth of both jaws together to effect immobilization. It is again obvious that this method of treatment would suggest itself to almost any

practical-minded person. According to Guerini:¹

In the fifth century B. C. Hippocrates described cases of fractures of the mandible and advocated the use of silk and linen ligatures and also gold wire with which to hold the broken fragments together.

Aulus Celsus, about 30 B. C., described ligatures for the purpose of fixation, and laid particular stress on the use of horse hair. He also advocated the use of a sling for bringing the teeth of the opposite jaw in correct apposition with those of the broken fragments . . . Note: Early through of necessity for keeping on tension.

Ruggero of Parma, in the year 1180 wrote:²

In the fractures of the mandibula, the lower teeth are not in contact with the upper ones and the patient cannot masticate. Then the patient must be taken by the lower maxilla and this must be moved here and there until the lower teeth will touch the upper ones.

5. *Gilmer Methods*—It was Doctor Gilmer of Chicago who worked out a practical and efficient method of treating fractures of the jaws: by wiring the teeth of the opposing jaws together. There are two methods, known as the Gilmer number 1 and number 2 (Fig. 1).

The figure-of-eight loop technique is a modification of the Gilmer number 1 and number 2 methods, combining certain principles of both methods (Fig. 2). The Gilmer number 2 method, by which an alignment wire of 14 gauge is adapted to each dental arch and held in place by being ligated to the teeth with 24 gauge wire, is universally applicable when enough teeth are present. This has the advantage over the Gilmer number 2 method in that it permits the cutting of the intermaxillary wires to open the mouth for inspection, the removal of a tooth, the drainage of an abscess, or any other exigency that might arise during the course of treatment without unfixing the relationship of the fragments held in place by the alignment wire.

6. *Elastic Force*—I wish to call attention to the application of an elastic force by means of the rubber bands, as used by the orthodontist in moving teeth. In the correction of

fractures these elastic forces are applied to the fragments instead of to the teeth. We have been using rubber bands for more than ten years, and I am sure that the orthodontist has been using them much longer, whenever he has been called in to assist in handling fractures by the use of banded appliances.

I have discussed the treatment of these fractures in a general way, because I wish to emphasize the fact that fractures of the jaws belong to the field of dentistry and not to the general surgeon.

ROENTGENOLOGIC DIAGNOSIS OF FRACTURES

The diagnosis of a fracture may be self-evident, and again, there may be certain types of fractures in some locations which are completely overlooked even after roentgenographic examination. These usually are fractures at the neck of the condyle. The usual method of taking roentgenograms in the search for fractures of the mandible is to make two lateral jaw exposures. Often in these roentgenograms the head of the condyle is projected over the spine and the outline of the upper part of the ramus is lost or obscured by overlapping shadows. An anterior roentgenogram of the head, as is taken for a maxillary sinus roentgenogram, brings the entire mandible into view, so that the danger of overlooking a fracture at any point in the mandible is hardly possible. With reference to roentgenologic diagnosis, I might add that in fractures of the maxilla, also, there is the difficulty of the overlapping shadows. In roentgenograms of these fractures there is the entire skull casting its shadow, which overlaps the maxilla and obscures the structures sought, so that one must be guided more by the clinical than by the laboratory observations.

While the roentgenogram is a valuable guide in determining the type and location of the fracture, good clinical judgment is of the utmost importance in making a diagnosis. There is always the history of an injury. The direction and application of the forces striking the jaw determine the type and location of the fracture.

¹ Guerini, Vincenzo: History of Dentistry, Philadelphia, Lea & Febiger, 1909.

² Brophy, T. W.: Oral Surgery, Philadelphia, P. Blakiston's Son & Co., 1915, page 390.

FRACTURES OF THE MALAR BONE

A blow struck over the malar prominence produces a depressed fracture of the malar bone. As the malar bone articulates with the maxilla and completes the cavity of the maxillary sinus a depressed fracture of the malar bone may also cause a fracture of the maxilla.

The maxilla could be compared to an empty box; apply a sufficient blow to the side of the box and it caves in; and yet, the fact that the malar bone can be driven into the maxillary sinus, carrying with it the floor of the orbit, is so often completely overlooked that the elevation of the malar bone back to place is neglected and usually leads to permanent deformity.

REPORT OF CASES OF FRACTURE OF THE MALAR BONE

CASE 1—History—A young woman suffered from a depressed fracture of the malar bone (Fig. 3) which was not corrected and has left her with an extreme asymmetry of the face and with double vision.

Cause—If we ask ourselves the question, how such an oversight can happen when the correction at the time of injury is so simple a matter, we will find the answer comparatively easy. Usually accompanying the depressed fracture of the malar bone there is a subcutaneous hemorrhage into the conjunctiva and the soft tissue of both eyelids with an extensive edema. The swelling, of course, distorts the entire deformity, and the fracture is overlooked until the swelling subsides. The roentgenogram may in these cases again be deceptive because of the problem of superimposed shadows of the bones of the skull.

Diagnosis—In a depressed fracture of the malar bone the diagnostic manifestations are (1) a depression of the cheek prominence; (2) a break in the continuity of the inferior orbital margin, which can be palpated; (3) an anesthesia in the area of the distribution of the infra-orbital nerve, as it is usually caught in the fracture.

The malar bone forms the lower and outer margin of the orbit and completes the apex of the maxillary sinus. The anatomic description of the maxillary sinus is that of a three-sided pyramid with its base toward the nose and its apex toward the malar bone. The three sides of the pyramid are the facial, the orbital, and the zygomatic. A blow on the malar bone, if of sufficient violence, drives the malar bone into the maxillary sinus and may break the facial, the

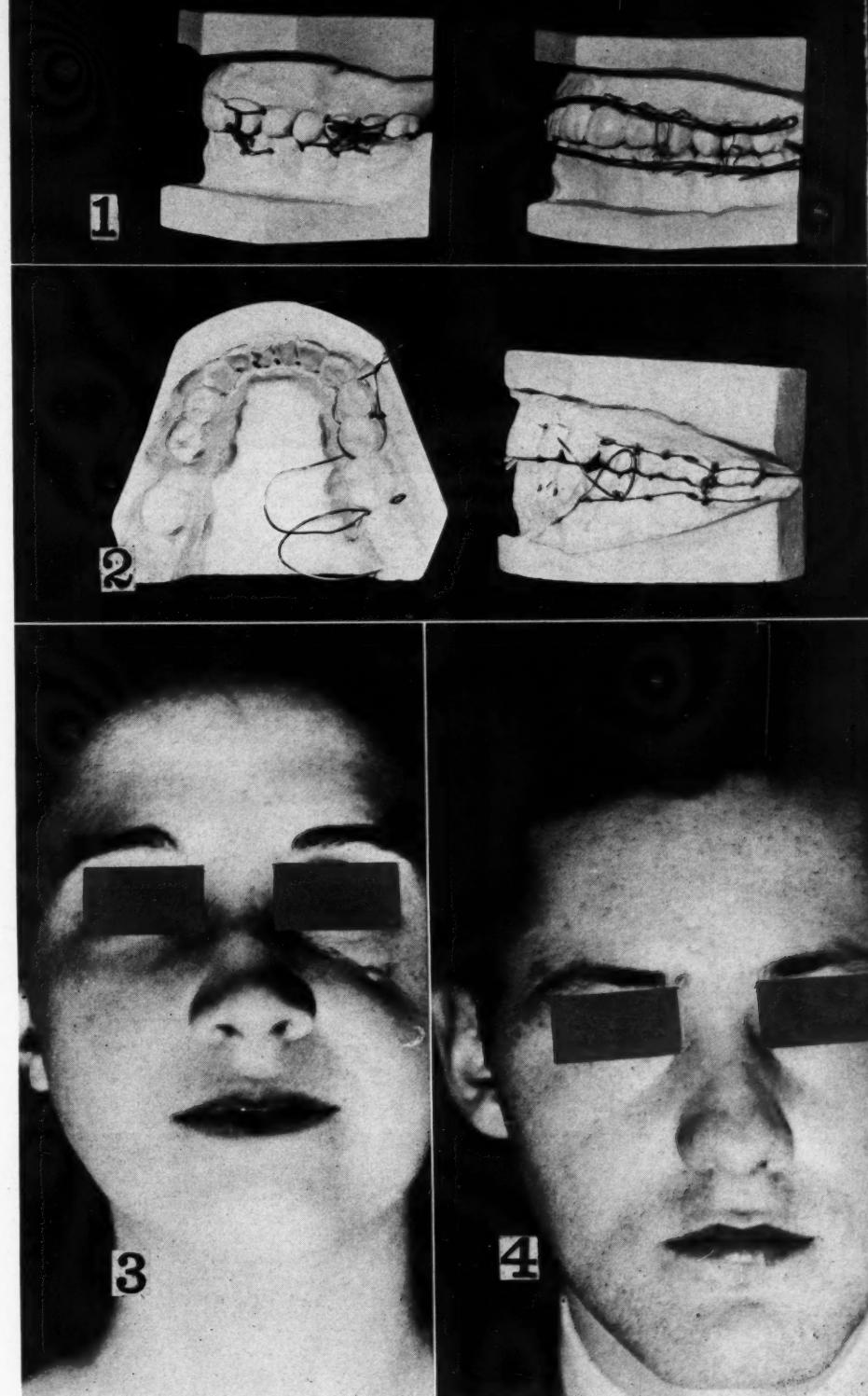


Fig. 1—Gilmer number 1 and 2 wiring technique.

Fig. 2—Figure-of-eight loop method of wiring.

Fig. 3—Uncorrected depressed fracture of malar bone.

Fig. 4—Transverse fracture of the maxilla with a badly comminuted and depressed fracture of the malar bone, which was elevated through the maxillary sinus. No permanent deformity resulted.

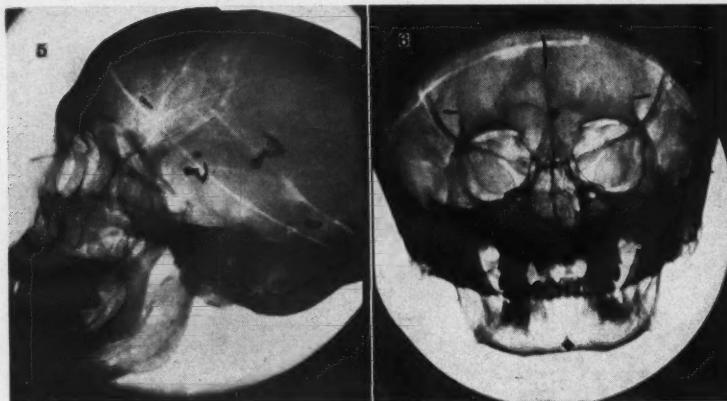


Fig. 5—Compare fragile character of facial bones with the skull. Severe blows to upper part of face may fracture these from base of skull.

Fig. 6—A direct blow to upper part of face will cause fractures to occur at weakest point; namely, through antral and nasal cavities, and extending into orbits.

orbital, and the zygomatic surfaces. Often these parts are severely comminuted.

Treatment—The treatment consists of (1) making an incision in the buccal sulcus just beneath the upper lip and cheek down to the bone; (2) retracting the soft tissues, and (3) locating the fracture on the facial surface of the maxilla. At this point there is usually an opening into the maxillary sinus. (4) A curved trocar is then inserted into the maxillary sinus and carried to the under surface of the malar bone. (5) The latter is then lifted upward and outward, restoring the lost facial contour in the region of the malar prominence. (6) The sinus is packed for four or five days in order to hold the fractured bones in place. I have corrected about fifteen of these fractures.

CASE 2—History—The patient, a boy, had a severe automobile injury.

Examination—The presence of a tear in the nose along the alar cartilage enabled me to pass a gloved finger into the maxillary sinus through the nasal side. The impression my finger gave me was that of multiple fragments, which felt very much like a crushed egg shell. I was able to manipulate these fragments with my index finger and could feel the break in the floor of the orbit and zygomatic surface.

Treatment—By lifting the fragments to their relative normal positions and packing the sinus through the nose, this patient has recovered without any sign of a deformity (Fig. 4).

I have discussed the depressed fracture of the malar bone because it is usually associated with a fracture of the maxilla. This is the most frequent type of such fractures because of the exposed position of the malar bone which makes it the object of

blows applied to the upper part of the face.

COMPLETE TRANSVERSE FRACTURE

The next type of fracture of the maxilla which I will discuss is a complete transverse break detaching the maxilla from the base of the cranium. Again, if we visualize the upper bony framework of the face we will find that it is like a bay window projecting downward from the base of the cranium, and for the most part consists of cavities and the maxillary sinus (Figs. 5 and 6). It is obvious that these cavities weaken the bony framework of the upper part of the face, so that a direct blow to that region of the face, such as a kick from a mule or being thrown violently forward onto the steering mechanism of a car, will result in tearing these bones from the base of the cranium. Such breaks may pass through the orbits or the maxillary sinus and nasal cavities. Here again, roentgenographic observations are not helpful, but the clinical observations are positive. When one grasps the upper jaw the entire hard palate and all the upper teeth may be moved. The teeth may be out of occlusion; the loss of occlusion is significant evidence in the diagnosis of a fracture of either jaw; and the occlusal derangement may lead to a correct diagnosis. Often in a fracture of the neck of the condyle, when it has been otherwise overlooked, it may be recognized by the type of loss of occlusion.

The correction of a complete transverse fracture of the maxilla may present interesting problems:

REPORT OF CASES OF COMPLETE TRANSVERSE FRACTURE

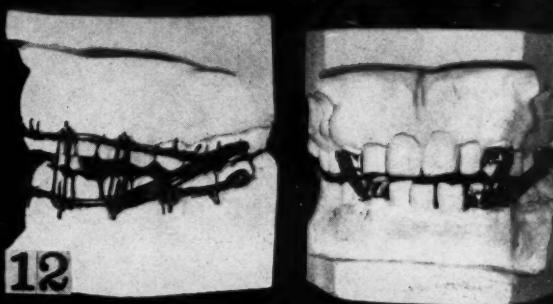
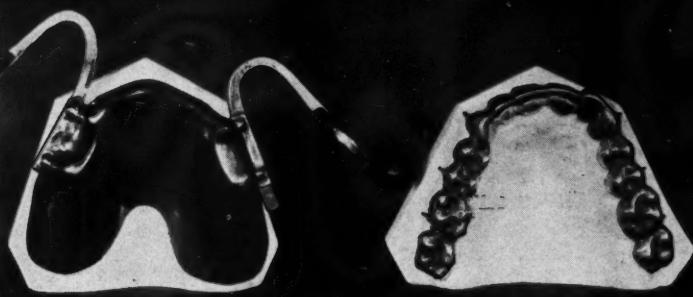
CASE 1—History—A boy, aged 7 years, was struck by an automobile, and a complete transverse fracture of the maxilla and depressed fractures of the nasal bones resulted. The entire upper arch was freely movable. The patient was first seen by a nose and throat specialist, who elevated the nasal bones into position and packed the nose. He then attempted to control the maxillary fracture by a Barton bandage. With the nose packed and the boy's mouth closed by the bandage, respiratory difficulty resulted, which made it necessary to remove the Barton bandage. The nose and throat specialist then recognized the need for an oral surgeon.

Treatment—A Kingsley splint was used. The top of the head afforded a fulcrum for the application of force. When the maxilla was carried to place, pressure was applied to the chin to hold the teeth in occlusion. The result was good (Figs. 7, 8, and 9).

CASE 2—History—The patient, a man, had a complete transverse fracture. He was first seen by a nose and throat specialist, who corrected the nasal fracture but overlooked the maxillary fracture.



Fig. 7—Complete transverse fracture of maxilla being seated by Kingsley splint.
Fig. 8—Occlusion stabilized by using mandible as splint to fractured maxilla.



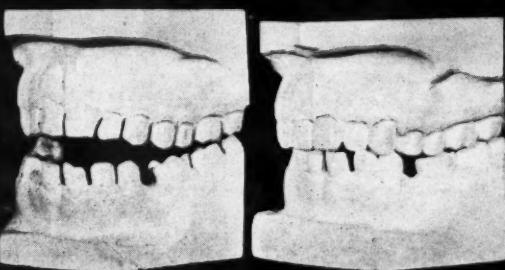
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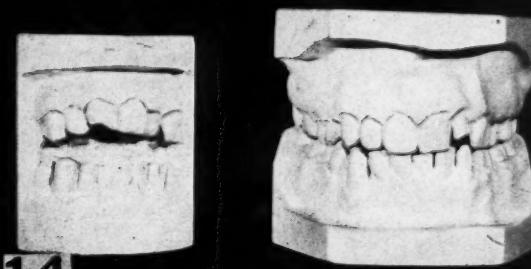
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Fig. 9—Kingsley splint; also a cast metal cap splint.

Fig. 10—Open bite occlusion due to maxilla having been driven backward and downward in a complete transverse fracture.

Fig. 11—Occlusion before and after the entire maxilla had been drawn to place by intra-oral forces applied through elastic bands.

Fig. 12—Gilmer appliance used to apply pull to the maxilla. Bands later used as retaining appliance to hold maxilla until union of fracture took place.

Fig. 13—Note complete amputation of entire maxillary arch and hard palate, carrying away the floor of the nose, opening the nasal and maxillary sinuses into the mouth cavity.

Fig. 14—Open bite as a result of improper reduction by Gilmer method; also final result as obtained by the use of elastic bands applied to rotated fragment which brought the fragment into proper position.

After five weeks of nasal treatment it was discovered that the teeth were out of occlusion. Only the third molars were in contact which gave the patient an open bite (Fig. 10).

Treatment—Intramaxillary traction, by the use of rubber bands, was used to pull the entire upper maxilla downward and forward (Figs. 11 and 12).

COMPLETE AMPUTATION OF ALVEOLAR ARCH

An unusual fracture, resulting in the complete amputation of the entire upper alveolar arch including the hard palate came to my attention. Fig. 13 shows the amputated arch and palate. This case happened in Canada:

A girl, sliding on a toboggan, ran into a wire fence. A satisfactory explanation of the injury would be that the taut wire passed into the mouth, hooked itself back of the maxillary tuberosities and by some change in the direction of the force came forward; acting almost as a knife, it severed the maxillary arch and palate from the nasal cavities and the maxillary sinuses. One could visualize the maxillary sinus and nasal cavities opening into the mouth, and requiring some type of plastic surgery for repair. I later went to Canada to see this patient to satisfy my curiosity as to the result of the injury.

FRACTURE OF THE MANDIBLE

So far only fractures of the maxilla have been discussed, because of the nature of the problems involved. Fractures of the mandible outnumber fractures of the maxilla ten to one, I believe. I do not have any available figures to verify this statement; only clinical observation.

I will now discuss three cases of fractures of the mandible. I am not concerned with the simpler type which merely calls for the wiring of the teeth of the two jaws together, but with such cases as offer problems for solution.

CASE 1—History—A boy's teeth had been wired together without alining the broken fragments properly; deformity and an open occlusion resulted (Figs. 14, 15, and 16).

Examination—There was a fracture at the neck of the condyle on one side and also between the cuspid and lateral incisor on the other side. The long fragment was rotated.

Treatment—Here again intramaxillary elastic forces were used to bring the broken fragments into their proper relation (Figs. 17 and 18).

Fractures of the neck of the condyle present extremely interesting problems. The general surgeon wishes to resort immediately to an open operation for realinement of the fragments on the theory that if he does not a bony ankylosis will result.

If we stop to estimate the difficulty of doing any surgery about the neck of the condyle, we will hesitate before advising such an attempt. First, the facial nerve is endangered unless the incision for approach to the condyle

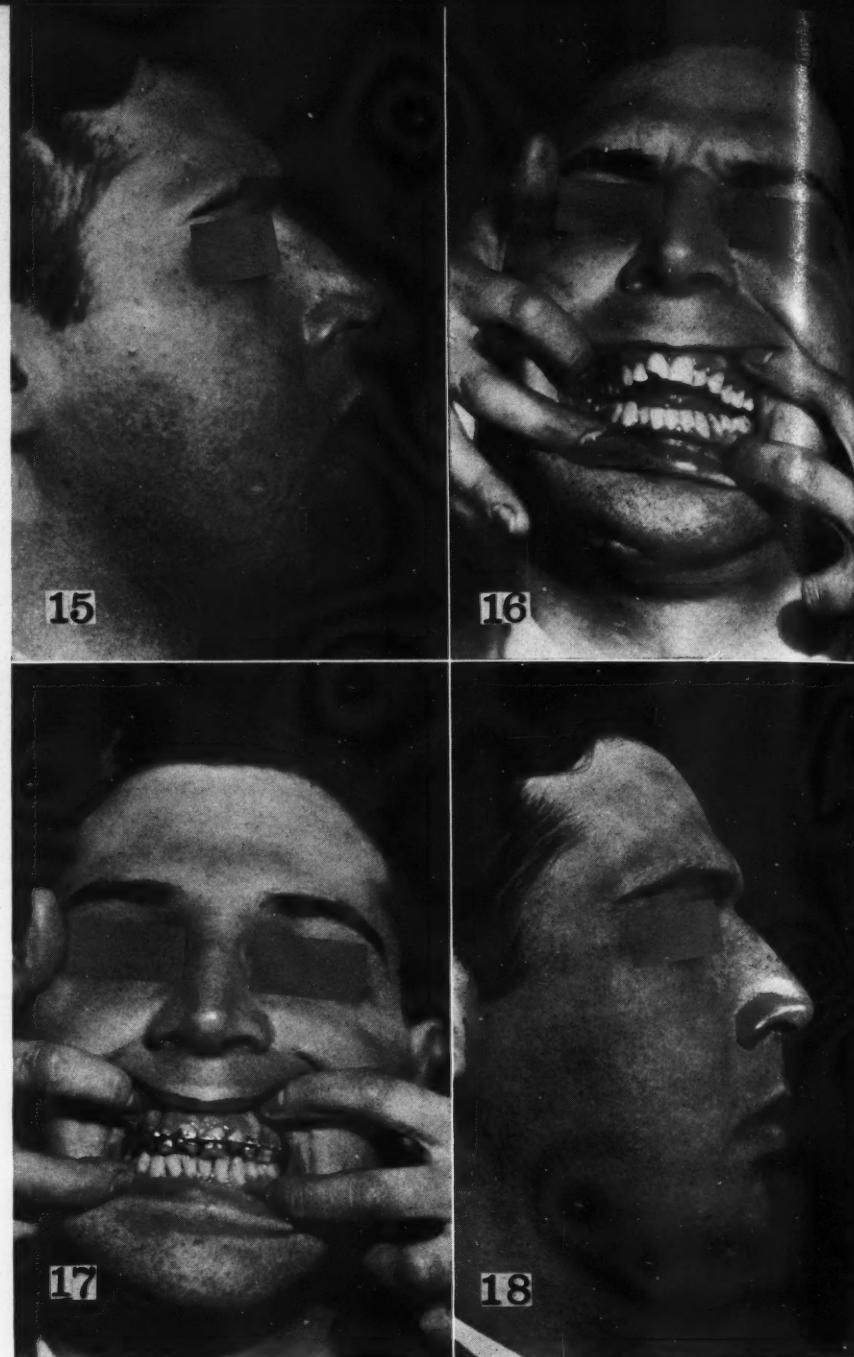


Fig. 15—Note inability of patient to bring lips together because of open bite owing to the fracture of the mandible.

Fig. 16—Open bite. Wiring was allowed to remain for two weeks (Gilmer method). The operator has failed to obtain proper reduction of fragments.

Fig. 17—Occlusion restored by use of elastic forces applied to misplaced fragments.

Fig. 18—Final profile view.

is carefully planned. Second, the external pterygoid muscle is inserted at the neck of the condyle and helps to maintain the displaced position of the condylar fragment, and resists correction of the fragment. Third, the attempt to drill holes and pass a wire through the short fragment is exceedingly difficult. My advice has been to leave the displaced fragments alone and correct the jaw relation by wiring the teeth together.

Figs. 19 and 20 show fractures of the necks of both condyles with the short fragments badly displaced. All that was done was to wire the jaws together for three weeks. The patient had a good functional result. I have been following this case with roentgenograms for four years and it is exceedingly interesting to note the repair that has taken place and the modification of the condyles to maintain function.

I have treated numerous cases of this type of fractures by wiring the teeth with satisfactory results. The

only surgery I would contemplate in such a case would be the complete removal of the head of the condyles.

History—A young woman was shot through the lower jaw. A segment of bone was carried away. The bullet passed through the tongue and lodged in the pharynx.

Examination—When I first saw the patient she was having great difficulty in swallowing. The bullet was lodged close to the spine in the posterior pharyngeal wall. At first, there was the question of the extent of injury done by the bullet to important structures. It was thought that the esophagus had been severely injured. There was also a question as to the advisability of probing for the bullet with the risk of producing an extensive edema in this region to interfere with respiration.

My advice was that we could defer the wiring of the jaw for ten days or two weeks. In that time, the patient coughed up the bullet and at the end of two weeks was in a satisfactory physical condition to have her jaws wired. As there was a loss of bone substance in the anterior part of the mandible, it was important to maintain the relationship of the teeth of the lower lateral fragments to the teeth of the upper jaw to prevent a collapse of these fragments in the midline, resulting in what was described during the war as a "bird face."

Treatment—The lower jaw fragments were wired to the maxilla for about two months, when an attempt was made to construct some type of retaining appliance. Even after this length of time we had difficulty in maintaining separation of the lateral fragments at the midline and had to resort to a jack screw appliance to drive these fragments farther apart because of scar formation in the floor of the mouth.

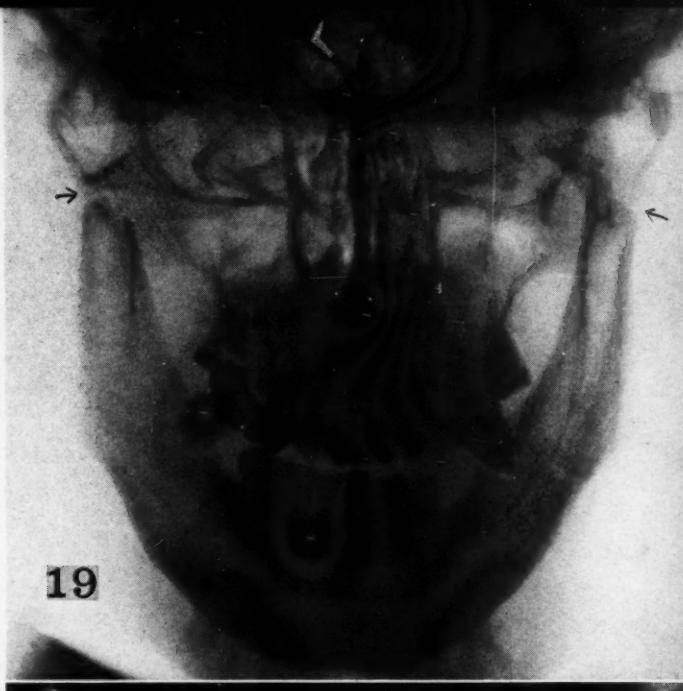
Because we realized that the patient would need a bone graft to restore the lost segment, and because grafting will not succeed if done shortly after an infection, a retaining appliance was planned to maintain separation of the fragments, and to carry teeth for esthetic reasons.

Course—This appliance was worn for a year in the hope that bone regeneration might bridge the gap and bring about a united jaw without resorting to surgery. After one year, while considerable bone had regenerated, a non-union still existed, which was corrected by a periosteal bone graft (Figs. 21, 22, and 23).

It is important to remember that one should not attempt immobilization of severe fractures until one is certain whether the patient is going to recover from the injury. The wiring of the teeth together is never an emergency procedure and one can well afford to wait from a week to ten days before instituting immobilization by wiring or splinting. As a matter of fact, in extensive injuries of the soft parts associated with fractures of the jaw, it is better to introduce irrigation by antiseptics in the attempt to prevent an acute infection.

I was once called in to see a physician, who had been struck by an automobile, the accident resulting in a fracture of the mandible. The attending surgeon thought something should

Fig. 19—Fractures of both necks of the condyles of the mandible. Note extreme displacement of the left condylar process.



19

Fig. 20—Note how condyles have fused with mandible without loss of function. No surgical intervention.



20

be done about this fracture immediately because of the great displacement of the fragments and the complete relaxation of the muscles which allowed the mouth to hang open. The patient appeared to be severely injured; therefore, I resorted to the use of a Barton bandage. I promised to return in the morning to plan the wiring of the jaws. When I returned the next day I learned that the patient had died during the night. It certainly would not have been demonstrating good surgical judgment to wire the jaws of a dying patient.

A patient with a fracture which

followed the removal of a deeply submerged mandibular third molar was referred to me for treatment (Fig. 24). Such accidents often occur under nitrous-oxide oxygen anesthesia. The exodontist is often placed in a difficult position. An attempt has been made by someone else, usually under block anesthesia, to remove a tooth. The attempt ends in failure, often with the crown broken off and the major portion of the tooth still deeply embedded. By the time the patient reaches the exodontist the tissues are swollen, and the patient is extremely nervous and suffering from severe pain. The dentist who at-

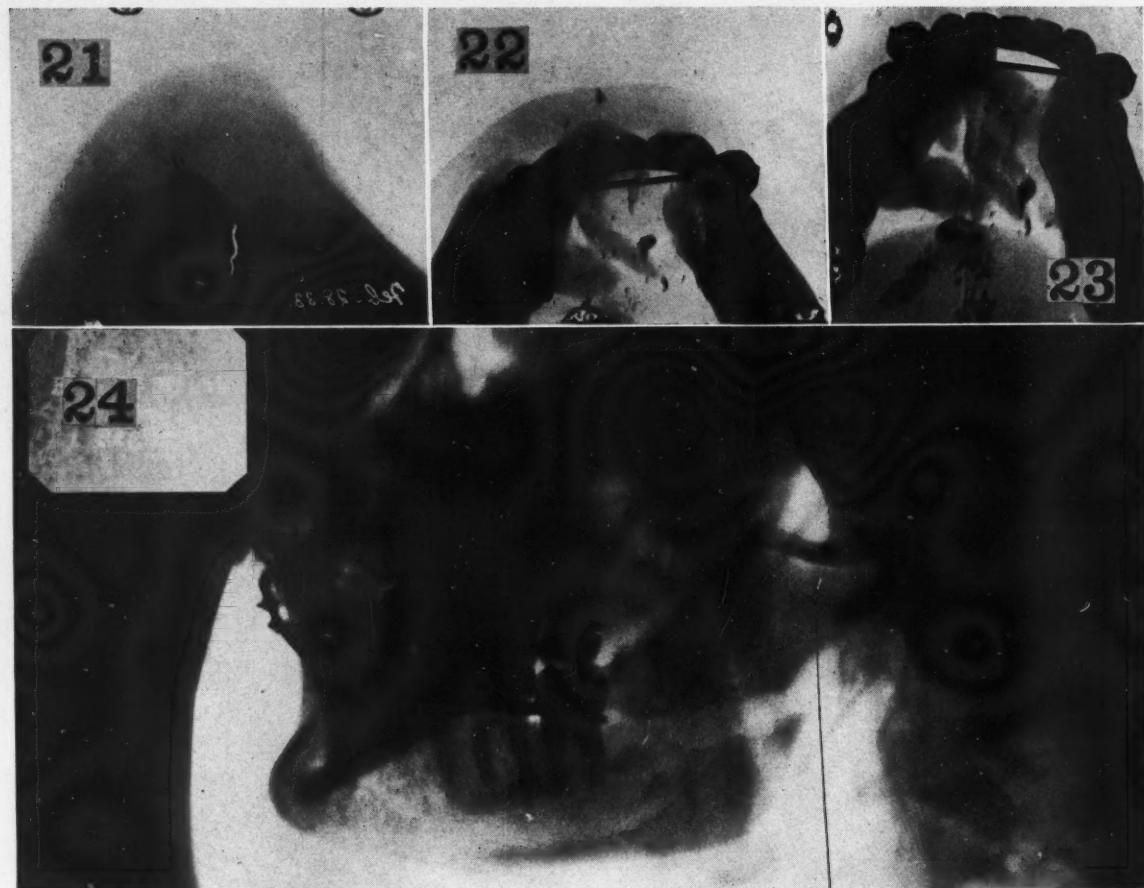


Fig. 21—Note collapse of fragments at midline.

Fig. 22—Retaining appliance worn for one year.

Fig. 23—One year later. Periosteal bone graft.

Black markings are retained bullet fragments.

Fig. 24—Fractured mandible following removal of impacted third molar.

tempts to remove the tooth is troubled and is anxious to have the tooth removed under a general anesthetic. Here the danger lies in the fact that under nitrous-oxide oxygen anesthesia it is extremely difficult to bring the field into view; one is apt to resort to elevation of the tooth fragment which results in a fractured mandible. The better procedure would be to irrigate until all inflammatory and infectious reaction had subsided and then remove the tooth under controlled conditions.

SUMMARY

1. Fractures of the maxilla and mandible are primarily mechanical

problems belonging to the field of dentistry. They offer many intricate problems for the application of dental mechanics. Any dentist should have sufficient mechanical ingenuity to solve these problems.

2. Fragments must be brought into proper alinement by the application of intra-oral forces, often in the form of elastic bands adapted to a properly constructed mechanical appliance.

3. Alineation of fragments and restoration of occlusion with immobilization are the cardinal principles of treatment.

4. Occlusion of the teeth is the final test for the proper reduction of the fracture, except in those cases in

which the fracture exists in the mandible beyond the body of the bone. In other words, the teeth of both jaws may be in occlusion but the ramus of the jaw, when the fracture exists back of the third molar, may still be out of alinement. Fractures of the coronoid or condylar process will not be brought into alinement by restoring proper occlusion, but the operator can bring about as satisfactory an alinement as is obtainable without surgical intervention.

5. Surgical intervention is only indicated when one is sure that mechanical correction with intradental splints will not succeed.

The Editor's Page

TOO much of the literature on dental economics is detached from the realities of dental life and practice. At one pole are the impracticable, unworkable theories of visionaries; at the other pole, the frigid statistics of professional economists which have been accumulated at considerable expense and effort. The first category of material is valueless simply because it is not generally applicable to dental practice. Here are included the sales-talks of self-appointed dental economists and the stunts that ill-advised dentists have originated to attract patronage.

The second category of material, that prepared by competent economists, may suggest in the cold terms of science the dental needs of groups of people and how these needs are being met. For the most part these studies have merely repeated a self-evident and conspicuous fact: the dental market is geographically all inclusive; all age groups are in that market; nevertheless, the need is not being generally met. Seldom have such reports suggested what the *individual* dentist might do about the matter to help the public and himself.

In this issue appears an article by Winfield S. Fisher which does not fall into either the first or second category mentioned. This article is significant because it has been prepared from source material that is available to *every* dentist; namely, the dentist's own records. Doctor Fisher, in preparing this valuable article, was no doubt prompted by the attitude constantly expressed by patients: "Dentistry is too costly." Doctor Fisher did not meekly agree with this protest and arbitrarily reduce his fees nor did he disagree by futile argument. He set about to examine his own records to uncover the true picture of dental costs as it affected *his patients and his practice*. He found that if the public were divided into five groups determined by their attitudes concerning the cost of dental care only one group of consumers seeks dentistry and pays for the service without protest. The other four groups comprise the indigent who cannot buy; those who use the criterion of the advertising dentist; those who refuse to recognize the need for dentistry until an emergency forces it upon them (as they are unprepared, any fee seems excessive); and those who appreciate the need, pay a fair fee, but feel that they are paying plenty.

In terms of specific figures, these signifi-

cant observations have been made:

(1) Of so-called regular patients, only 21.1 per cent seek services once a year or oftener; whereas 59.7 per cent appear at intervals from four to ten years; that is, about 80 per cent of these patients had no definite, sustaining dental habits. (2) of the regular patients, 69.5 per cent spent less than \$35.00 per dental bill. (3) In another series of 2319 patients, it was found that the average cost of \$33.34 per patient represented, in many cases "heavy" dentistry; prosthetic appliances, large restorations, prolonged treatment. In other words, the patient's neglect and poor dental habits result in an increased cost.

With these records as a basis, Doctor Fisher figured that if these patients had sought early dental care the average cost would have been \$20.43. That is to say, each patient paid a penalty of \$12.91 or 63.19 per cent for his neglect. These statistical observations substantiate a point of view that I have expressed on other occasions.¹

As the author suggests, the educational efforts of the dental profession should be built around the basic idea that the amount of the dental bill may be determined by the patient himself by forming proper dental habits. This is the message he wisely believes should be carried by the profession to the public:

"I can give you what you need at a price that you can pay. Whether you want it or not is up to you. The price that you pay for neglect is your responsibility. Neither society nor the profession should pay it for you."

If dentistry were to be practiced under a true system of prevention the fuss and fury concerning the contention that the cost is beyond the pocketbook of the average family would be answered. For a dollar or two a month the dental needs of the average person can be met, provided that the mouth is first restored to a healthful condition. This yearly expense of from \$12.00 to \$24.00 per person is based on fair fees to dentists in private practice.

No change in the system of practice is necessary; no expensive administrative units are required. Any public educational activities of the dental profession might well be pointed toward a true and frank discussion of the cost of dental care, dignified by the language of a profession, and free from the suggestions of apology or salescraft.

¹Ryan, E. J.: The Economic Aspects of Preventive Dentistry, J. A. D. A. 18:896-904 (May) 1931; The Maintenance of a Family Dental Practice, J. A. D. A. 21:705-712 (April) 1934.

A METHOD OF REPAIRING BROKEN BRIDGE FACINGS

G. A. STEVENSON, Jr., B.Sc., D.D.S.

Harvey, Illinois

THE method of repair here described I have used successfully for the last three years, not only for facings, but even for porcelain jacket crowns. Most fractures are clean breaks and there are usually only two fragments which can be waxed together with precision. My method deals with this type.

TECHNIQUE

1. Paint the broken edges with a thin mix of Steele's Superglaze.

2. Assemble the fragments by any method that permits their being joined with greatest precision. This may be done either on the bridge or out of the mouth. I prefer the latter. Apply sticky wax over the labial surface, especially over the fracture line.

3. When chilled, embed the lingual in a mix of investment sufficient to hold the parts together. While ordinary crown and bridge investment can be used, I prefer a porcelain investment.

166 East 154th Street.

Does the DIGEST ever accept unsolicited manuscripts or are all articles written at the request of the editor? I do not wish to submit material if its rejection is a foregone conclusion.

—D.D.S., Cleveland, Ohio.

EDITOR'S NOTE: About 50 per cent of

4. After the investment has set, remove the wax, and paint the entire labial surface with a thin mix of Superglaze.

5. Bake in any oven that will produce 1945° F.

6. The entire procedure takes less than an hour.

7. The reason that the facing broke should be ascertained, and proper correction made with grinding.

ADVANTAGES

1. The lingual surface of the facing and the backing are continuous, just as when the bridge was originally constructed. To obtain this continuity is easy when the bridge is out of the mouth; however, when a new facing is ground to replace a broken one on a bridge that is not to be removed from the mouth, it is almost impossible to grind the facing so that the junction with the backing will be as continuous as it was originally.

Usually the new facing looks fine from the labial, but it conceals lingually an overjet of the backing which is an objectionable food trap.

2. In many restorations, especially removable, the gold is cast to fit a ground pontic. The repaired pontic will fit the cast gold, just as it did originally. To grind a new pontic to fit the gold is often difficult.

3. Repair can be made within an hour. This means that the patient need not wait several days until his dentist secures another facing of the correct size and shade from the supply depot.

4. This method of repair costs less.

5. Provided the bridge can be removed safely from the mouth, it is naturally preferable to use new facings for repair; however, especially with inlay abutments, the walls of the teeth may be fractured during the attempted removal. This method obviates that danger.

LETTER TO THE EDITOR

the material published in the DENTAL DIGEST represents voluntary contributions by interested writers. Every manuscript that reaches the editorial office is read carefully and a prompt report is made to the author. The DIGEST is neither awed by "big names" nor skeptical of obscure

ones, but appreciates the efforts of both. This is the editorial yardstick: *Does this presentation give information that the average dentist can use to advantage?* Anyone who has such information is encouraged to submit his material to the editor.

ABOUT OUR CONTRIBUTORS

WINFIELD S. FISHER received his D.D.S. degree from Northwestern University Dental School in 1919. Doctor Fisher has a general practice. He is a member of the A. D. A., Illinois State Dental Society, and Chicago Dental Society. Doctor Fisher has previously contributed to the dental literature on the subjects of root canal filling and dental caries. His present article is the subject of The Editor's Page in this issue.

DON E. WOODARD (D.D.S., 1923, State University of Iowa, College of Dentistry; M.S.D., 1930, Northwestern University Dental School) reported a case of NECROSIS FOLLOWING INFILTRATION in the August, 1934, issue of THE

DENTAL DIGEST. Doctor Woodard's professional biography appeared in that issue.

RUSSELL C. WHEELER, D.D.S. (1919, Washington University School of Dentistry) has made several contributions to the dental literature, notably a syllabus on TOOTH FORM, the publication of which was announced in THE DENTAL DIGEST of May, 1935. Doctor Wheeler is a member of the St. Louis Dental Society and the International Association for Dental Research and is assistant professor of oral anatomy and dental prosthetics at Washington University where he has taught since 1923. Doctor Wheeler also taught

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The professional biography of JOSEPH E. SCHAEFER appeared in the April, 1935, issue of this magazine.

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